MIDWAY

April 1993
16-43123-101

NBA JAM

KIT

This kit can be installed in a
2 player *or* 4 player cabinet!

Operations Manual

- Kit Installation & Operation
- Testing & Problem Diagnosis
- Parts Information
- Wiring Diagrams & Schematics

<u>INSTRUCTIONS FOR NBA JAM</u>

RED BUTTON - **"SHOOT"** ON OFFENSE; **"BLOCK"** ON DEFENSE

BLUE BUTTON - **"PASS"** ON OFFENSE; **"STEAL"** ON DEFENSE

WHITE BUTTON - **"TURBO":** ENABLES PLAYER TO MOVE **FASTER** AND ENHANCES OTHER ACTIONS. FOR EXAMPLE, RED & WHITE TOGETHER = **DUNK.** TURBO STRENGTH REMAINING IS DISPLAYED ON THE METERS LOCATED AT THE TOP OF THE SCREEN

WHEN PLAYING WITH A COMPUTER CONTROLLED TEAMMATE:
YOUR BUTTONS CONTROL WHEN HE SHOOTS OR PASSES BACK TO YOU.

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The specifications and parts identified in this manual are subject to change without notice.

NBA JAM
Kit

Table of Contents

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NBA JAM Kit

SECTION
ONE

Operation

Safety Notices

The following safety hints apply to all kit operators and service personnel. Specific warnings and cautions will be found throughout this manual where they apply. We recommend that you read this page, and also all of Section One, before preparing your kit for play.

⚠ CAUTION

Notice: Salvaged Parts

Parts salvaged from old games are required to complete your kit. These salvaged parts must operate perfectly; otherwise, the converted game can not perform properly or safely. Always repair circuit board malfunctions and cabinet damage before conversion is attempted.

Notice: Power Supply

Be sure the power supply from your old game is capable of +5V at 5A and +12V at 2A. These operating voltages are necessary for your kit. Your power supply must be FCC approved.

Notice: Monitor

This kit is not intended for use with X-Y monitors. Suitable monitors have horizontally mounted CRT's and raster electronics with inputs for red, green, and blue video, as well as Composite Negative Sync inputs.

Notice: Coin Mechanism

Be sure to clean and lubricate your old coin mechanisms. Servicing them is crucial to your game's earning potential and operation.

Notice: Coin Meters

Coin meters are not provided with this kit. Wiring information is provided as a convenience to the operator.

Notice: Servicing, Installing

Always turn your game OFF and unplug it before attempting to service or install your kit.

ATTENTION!

PROPERLY ATTACH ALL CONNECTORS. *Make sure that the connectors on each printed circuit board (PCB) are properly connected. If the connectors do not slip on easily, do not force them. A reversed connector may damage your kit and void the warranty. All connectors are keyed to fit specific pins on each board.*

Conversion Procedure

Inspection

Unpack the materials from the carton and inspect for obvious signs of damage. Use this checklist to be sure your kit is complete.

	Part Number	Item Description	Qty.
[ ]	A-14816-40023	CPU Board (T-Unit) Assembly	1
[ ]	A-14732-40023	Sound Board Assembly	1
[ ]	A-15652	Volume Control Assembly	1
[ ]	H-13411	JAMMA Main Harness	1
[ ]	H-16522	Player 3-4 Cable	1
[ ]	H-16155	Sound Power Speaker Cable	1
[ ]	16-43134-101	Manual	1
[ ]	16-9488	Controls Template	1
[ ]	20-9687-1	Red Push Button	4
[ ]	20-9687-2	White Push Button	4
[ ]	20-9687-3	Blue Push Button	4
[ ]	20-9687-7	Orange Push Button	4
[ ]	20-9806-1	Red 8-Way Joystick	2
[ ]	20-9806-2	Blue 8-Way Joystick	2
[ ]	31-1754	Control Panel Decal	1
[ ]	31-1747-1	Screened Marquee	1
[ ]	5795-10937-18	20 Pin Ribbon Cable	1
[ ]		Miscellaneous Hardware	

	Recommended Tools and Supplies
[ ]	Black Semi-gloss Paint
[ ]	Electric Drill
[ ]	Electric Screwdriver
[ ]	Grease Pencil or Marker
[ ]	Hex Driver
[ ]	180 Grit Sandpaper or Electric Sander
[ ]	Pliers
[ ]	Razor Knife
[ ]	Soldering Iron and Solder
[ ]	Wire Cutters
[ ]	Black Electrical Tape
[ ]	Quick-hardening Wood Putty

Cabinet Modifications

This kit can be installed into a 2 player or a 4 player game cabinet. The software will configure itself to a 2 or 4 player game based upon Dip Switch Setting UJ2 (see page 1-15).

1. Fill in gouges with a good quick-hardening wood putty. Sand cabinet and wipe it clean.

2. Repaint the cabinet with black semi-gloss paint. For games with wood grain sides: remove the old decals and clean the glue residue before painting. Allow paint to dry completely.

3. Pencil a line roughly at the top of the old graphic. Lightly moisten the cabinet with soapy water. Apply the decal starting at the top and working down. After the decal is in place, smooth it down, taking care to squeeze out the air bubbles. If you miss an air bubble, pop it with a razor blade or a pin and burnish it down. Allow 12 hours for the adhesive in the decals to set. Remove masking from decal.

4. Check the kit for an FCC sticker and apply it over the existing sticker on the cabinet.

   When Midway ships a game, it is in compliance with FCC regulation. Your sticker is proof. If the sticker is missing or damaged, legal repercussions to the owner or distributor of the game may result. If your game kit does not contain an FCC sticker, call Midway Manufacturing Company immediately. Order by part number 16-8587-795.

5. Apply the Game Play Instruction Decal (number 23 on the decal sheet) to the CRT viewing glass. Be sure the decal does not obstruct the CRT.

Control Panel Modifications

IMPORTANT: Placement of joysticks must be horizontal to the control panel for proper playing capability, (see control panel layout on page 1-6).

1. Remove the control panel buttons and joysticks and remove the old vinyl covering.

2. Use the Control Panel Templates to help you design your control panel. You will need to use a separate template for each player you intend to install. Position the joystick and buttons at a comfortable angle for each player. Refer to page 1-6 for template layout.

3. Drill holes as needed for the joysticks and control panel buttons. Plug previous holes with wood blocks, putty, cardboard, or epoxy. File the new holes smooth.

4. Carefully remove the backing on the vinyl control panel overlay. Place the overlay on top of the control panel. Prevent air bubbles from getting under the vinyl overlay.

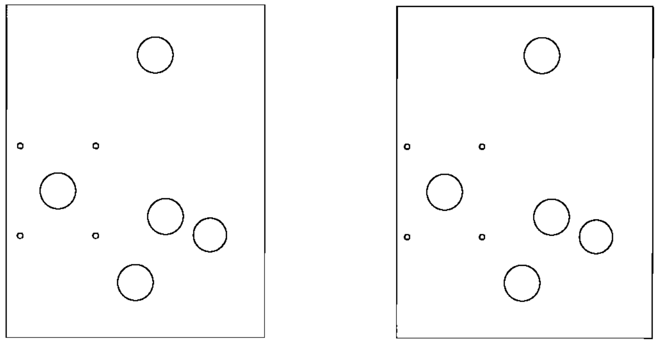
5. After the overlay is on securely, use a razor knife to trim excess and to cut holes for the control panel buttons and joysticks. Then, position the stickers around the appropriate locations. Refer to pages 1-7 for control panel button and joystick sticker locations.

6. Next, mount the pushbutton switches onto the control panel. Remove the switch from the pushbutton; Grasp the switch firmly on the left and right sides and squeeze the prongs together, (do not grasp the switch by the solder lugs). Carefully pull the switch off the housing. Unscrew the nut from the housing. Push the switch housing through the control panel from the front. Screw the nut back onto the switch housing from the back of the control panel. Carefully push the switch back into the switch housing.

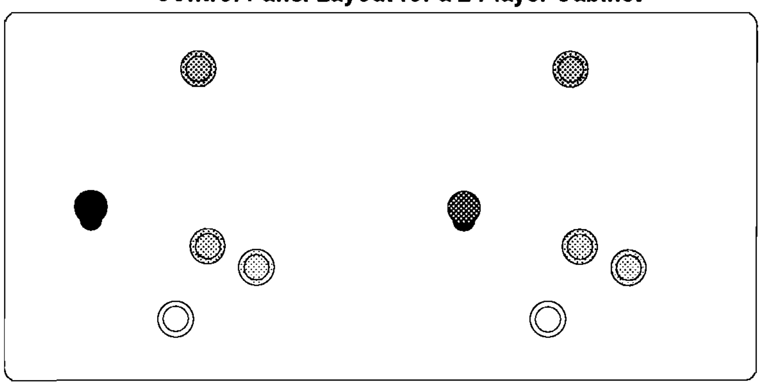
7. To mount the joystick assembly to the control panel first position the switch assembly so that the square base is against the back of the control panel and the hole in the base lines up with the joystick hole in the control panel. Be sure that one of the blade switches point toward the monitor when the control panel is closed. Secure the switch assembly to the control panel. Remove the e-ring, white plastic spacer, and spring from the joystick shaft. Slip the black plastic washer around the joystick shaft so the rough side faces the handle. Push the shaft through the joystick base from the front of the control panel. After the shaft is through the base, replace the spring, spacer, and e-ring.

8. Mount the volume control, using the screws provided, where it is easily accessible. On top of the cash box, or on the wall near the sound board are two possible locations.

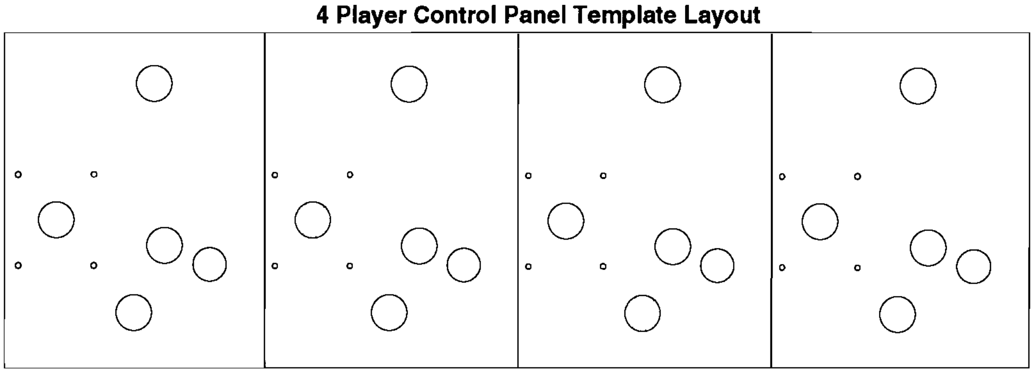
Control Panel Template Layout for a 2 Player Cabinet



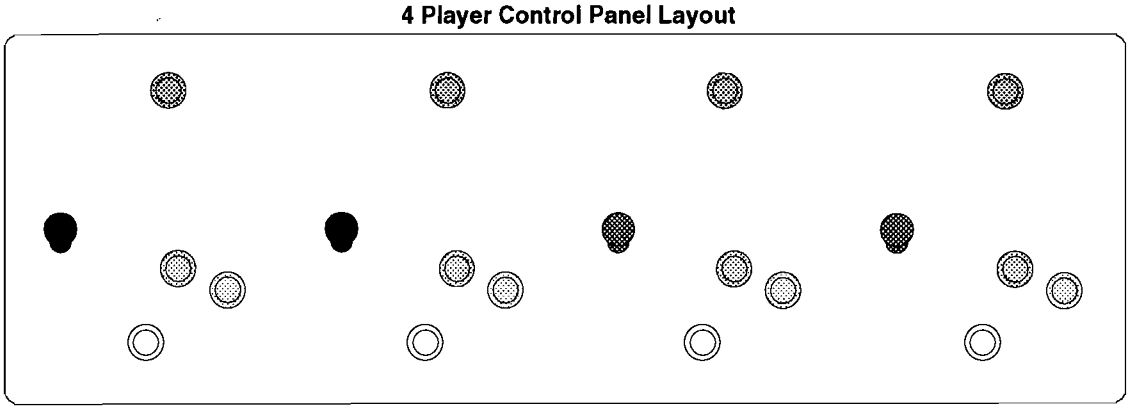
Control Panel Layout for a 2 Player Cabinet



4 Player Control Panel Template Layout



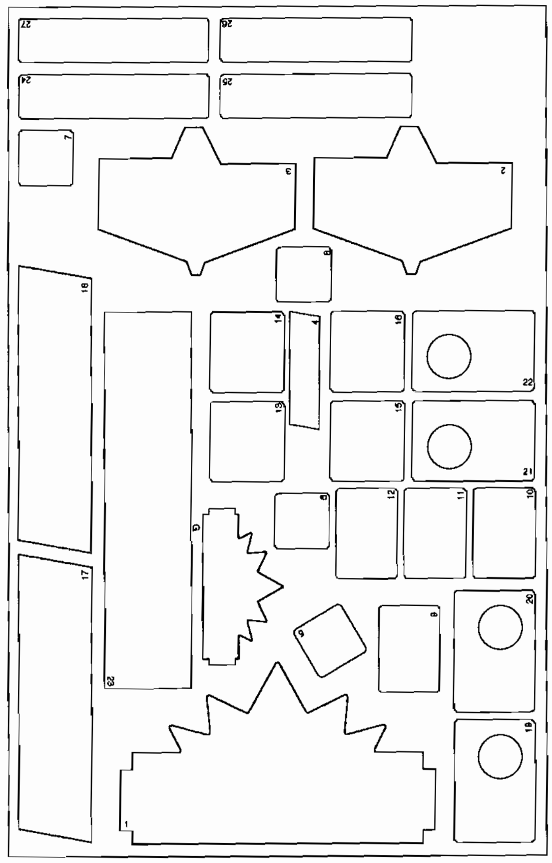
4 Player Control Panel Layout

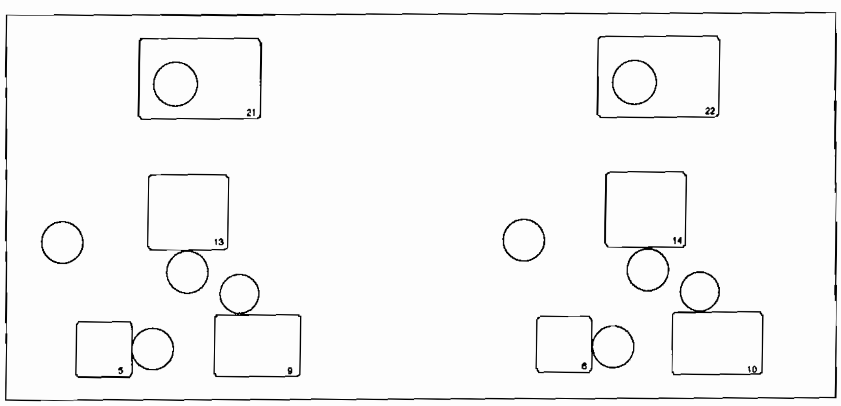


(Also refer to page 1-11)

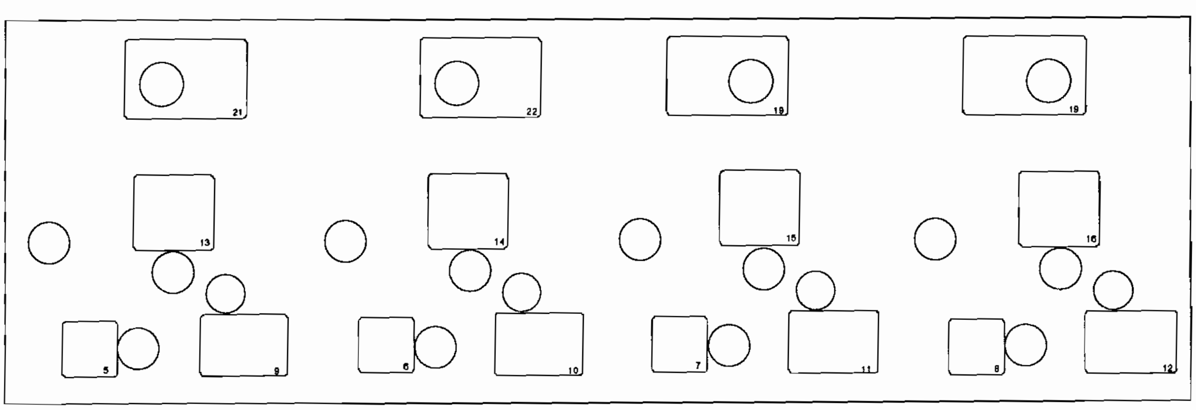
DECAL SET

(-1) NBA Jam Decal
(-2) NBA Jam Decal
(-3) NBA Jam Decal
(-4) Midway Decal
(-5) Turbo Decal
(-6) Turbo Decal
(-7) Turbo Decal
(-8) Turbo Decal
(-9) Pass/Steal Decal
(-10) Pass/Steal Decal
(-11) Pass/Steal Decal
(-12) Pass/Steal Decal
(-13) Shoot/Block Decal
(-14) Shoot/Block Decal
(-15) Shoot/Block Decal
(-16) Shoot/Block Decal
(-17) Midway Decal
(-18) Midway Decal
(-19) Player 3 Decal
(-20) Player 4 Decal
(-21) Player 1 Decal
(-22) Player 2 Decal
(-23) Bezel Instruction Decal
(-24) Best Value Decal
(-25) Best Value Decal
(-26) Credit Decal
(-27) Credit Decal





Decal Placement for a 2 Player Cabinet



Decal Placement for a 4 Player Cabinet

Installing PC Boards and Wiring into a JAMMA Game Cabinet

1. Disconnect and remove the existing CPU and sound board in the JAMMA game cabinet.

2. Mount the CPU board inside the JAMMA game cabinet where the old CPU board was located. Mount the sound board next to the CPU board using the stand-offs and screws provided.

NOTE

If you choose to use your own JAMMA cable and not the one provided in the kit, be sure to check the JAMMA Cable Chart to verify that it is compatible.

3. If you choose to use the JAMMA cable provided with the kit, unsolder the old JAMMA cable from the speaker, power supply, control panel switches (may already be disconnected), and coin door. Remove the cable from the game. If you are not going to use the JAMMA cable provided with the kit, check the JAMMA Cable Chart to be sure the old cable is compatible. Leave the power supply chassis as is.

CAUTION

Properly insulate any unused wires within the JAMMA cable, especially the gray, gray-green, and the gray-yellow wires. This is a fully wired JAMMA cable. Many of the wires will not be used for this kit. These wires have been installed so that you can use this cable for future kits.

4. Connect the JAMMA cable to P1 on the CPU board. Using the JAMMA Cable Chart or the Cabinet Wiring Diagram for reference, solder the correct JAMMA cable wires to the speaker, power supply, and the coin door. When connecting the control panel buttons and joystick switches, be sure to connect the correct color stripe wires to the correct switch. Follow the JAMMA Chart or the Cabinet Wiring Diagram, both in Section 3 of this book.

5. Connect the ribbon cable from P1 on the sound board to P12 on the CPU board. *Be sure that the red line on the ribbon cable connects to the same pin on both boards.* Connect the wire harness cable from P7 (speaker), and P6 (power), on the sound board to P3 (sound power speaker connector) on the CPU board.

NOTE

The ribbon cable may need to be twisted in order to connect it properly.

6. Only P1, P3, P5, P6 and P12 are used on the CPU Board. All other connectors on the CPU are not used.

7. Place the FBI Warning Label on the inside of the cabinet next to the PC boards. Be sure the label is completely visible.

Installing PC Boards and Wiring into a NON-JAMMA Game Cabinet

1. Disconnect and remove the existing CPU board in the game cabinet.

2. Mount the CPU board inside the game cabinet where the old CPU board was removed. Mount the sound board next to the CPU board using the stand-offs and screws provided.

3. Leaving several inches of wire, cut the wires at the coin door, control panel switches (which may already be disconnected), speaker, and power supply. Remove the existing harness from the cabinet. Leave the cable hooks in place.

CAUTION

Properly insulate any unused wires within the JAMMA cable, especially the gray, gray-green, and the gray-yellow wires. This is a fully wired JAMMA cable. Many of the wires will not be used for this kit. These wires have been installed so that you can use this cable for future kits.

4. Connect the JAMMA cable to P1 on the CPU board. Using the JAMMA Cable Chart or the Cabinet Wiring Diagram for reference, solder the correct JAMMA cable wires to the speaker, power supply, and the coin door. When connecting the control panel buttons and joystick switches, be sure to connect the correct color stripe wires to the correct switch. Follow the JAMMA Chart or the Cabinet Wiring Diagram, both in Section 3 of this book.

NOTE

Be sure all spliced wires are well insulated with black electrical tape.

5. Connect the ribbon cable from P1 on the sound board to P12 on the CPU board. *Be sure that the red line on the ribbon cable connects to the same pin on both boards.* Connect the wire harness cable from P7 (speaker), and P6 (power), on the sound board to P3 (sound power speaker connector) on the CPU board.

NOTE

The ribbon cable may need to be twisted in order to connect it properly.

6. Only P1, P3, P5, P6 and P12 are used on the CPU Board. All other connectors on the CPU are not used.

7. Place the FBI Warning Label on the inside of the cabinet next to the PC boards. be sure the label is completely visible.

Game Features

NBA JAM is a one to four player kit.

Starting Up

Switch ON power to the game. A "rug" pattern appears on the CRT screen. When the "rug" pattern ends, the screen shows CHECKING SCRATCH RAMS, and then CHECKING ROMS. The next screen shows NBA JAM REVISION LEVEL, CMOS TEST OK, and the COIN SETTING. The game then moves to the Attract Mode.

Insert the desired amount of coins or tokens. Select which player receives the credit by pressing the appropriate Player Start Button.

NOTE: When an error is detected during Start-up Tests, game start-up does not progress, and an error message appears on the screen.

Player Controls

- **Player Start Button**
  Each start button allows the corresponding player to begin game play.

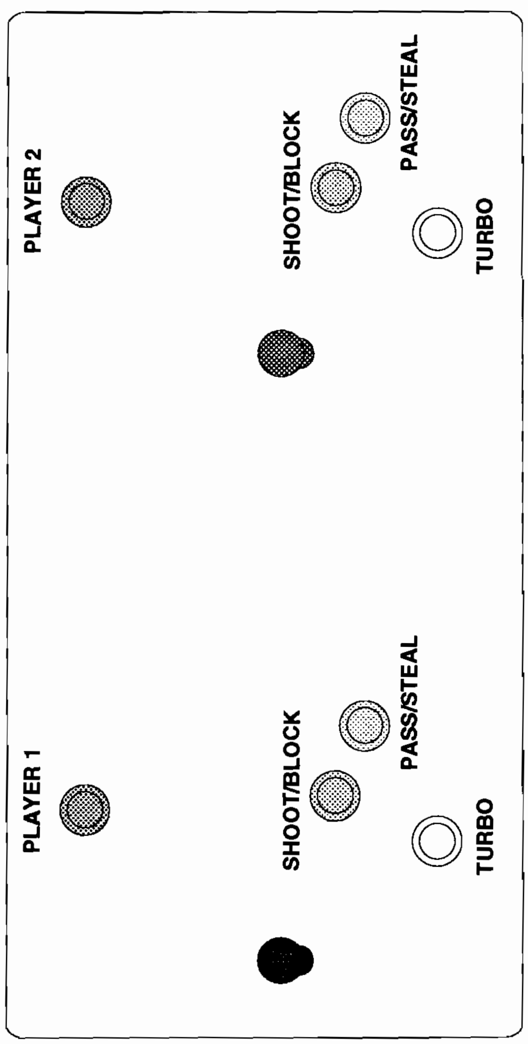
- **Turbo Button**
  The Turbo Button enables players to run faster and it enhances other actions as well (i.e. dunks, faster passes, etc.).

- **Shoot/Block Button**
  The Shoot/Block Button enables players to cause their on-screen player to shoot on offense and jump/block on defense.

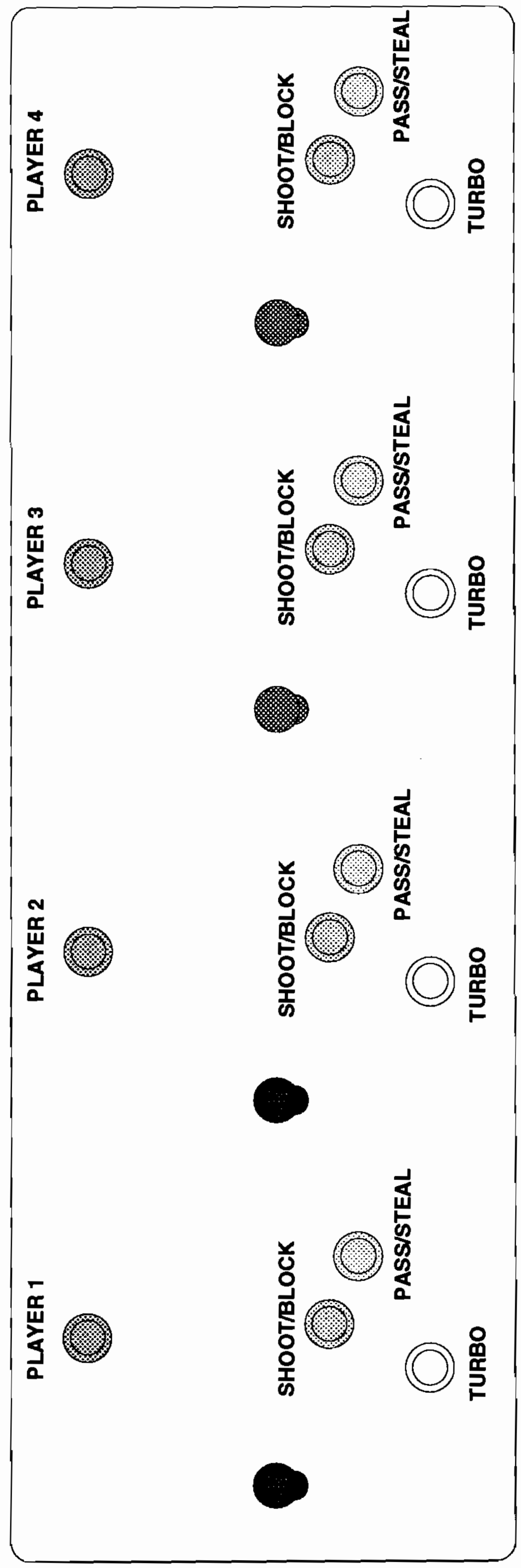
- **Pass/Steal Button**
  The Pass/Steal Button enables players to cause their on-screen player to pass on offense and steal on defense.

- **Joystick**
  Each players Joystick controls the eight-way movement of their on screen player.

Control Panel Layout



2 Player Control Panel



4 Player Control Panel



Game Operation

The NBA JAM Control Switches are located inside the coin door. These switches allow the operator to customize some features of the game.

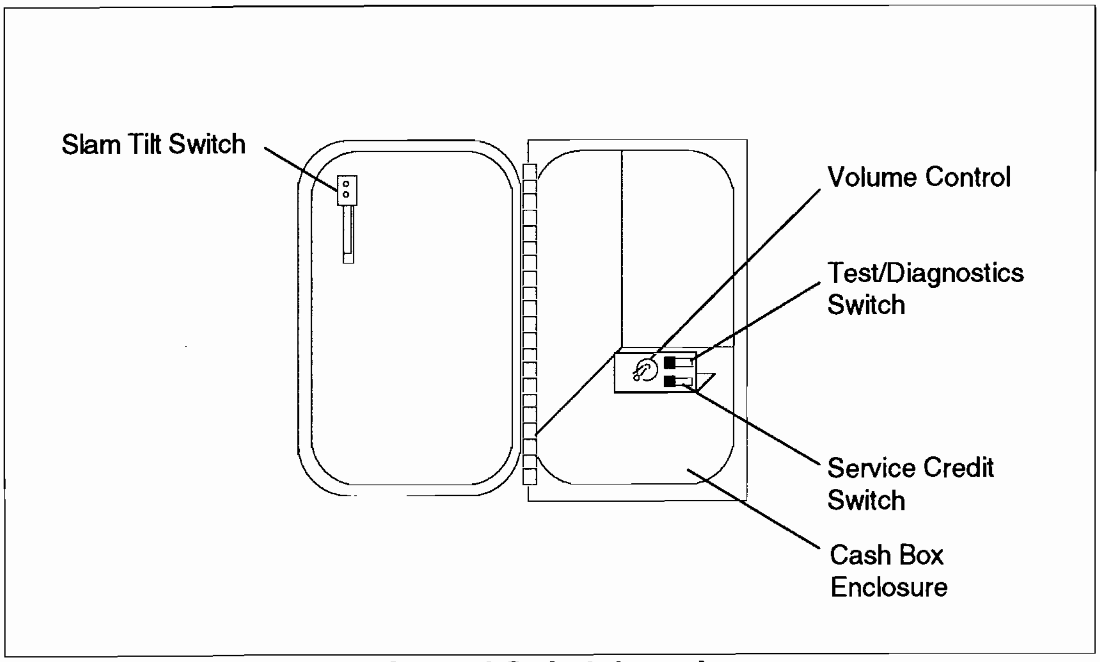
CONTROL SWITCHES

▩ The **COIN DOOR SLAM TILT SWITCH (optional)** detects any forceful vibrations against the Coin Door. This eliminates pounding for free games.

▩ The **VOLUME CONTROL** allows increasing or decreasing the volume level of the game music and speech. For greater profits, set your games volume at the loudest tolerable level.

▩ The **TEST/DIAGNOSTICS SWITCH (optional)** allows you to activate the games Menu System. Move the Test Switch to access the Main Menu. To exit the Menu System, select EXIT TO GAME OVER from the Main Menu, then press any control panel button, or return the Test Switch back to its original position.

▩ The **SERVICE CREDIT SWITCH (optional)** is a special feature switch that allots credit without affecting the games bookkeeping total.



Control Switch Location

Menu System Operation

OPERATION

All NBA Jam Game Audits, Adjustments, and Diagnostics are options of the Main Menu. Each option, in turn, has its own menu, listing several choices that you may act upon as desired.

Move the Test Switch (on the cashbox lid panel) to activate the Main Menu (shown below). Game adjustments, bookkeeping, and diagnostics are all accessible from this menu.

Move any joystick up or down to cycle through the menu options. Notice that the options are highlighted in sequence. Press any button to activate a highlighted option.

Note: Only highlighted options can be activated.

SELECT WITH ANY STICK
ACTIVATE WITH ANY BUTTON

DIAGNOSTIC TESTS

COIN BOOKKEEPING

GAME AUDITS

GAME ADJUSTMENT

UTILITIES

EXIT TO GAME OVER

Main Test Menu

DIAGNOSTIC TESTS

To enter the Diagnostic Tests from the Main Menu, move any joystick to select (highlight) the Diagnostic Test option, and press any control panel button to activate the option.

SELECT WITH ANY STICK
ACTIVATE WITH ANY BUTTON

SWITCH TEST

DIP SWITCH TEST

CPU BOARD TEST

SOUND BOARD TEST

MONITOR PATTERNS

RUN BURN-IN TEST

RETURN TO MAIN MENU

Diagnostic Test Menu

Switch Test

The Switch Test allows the operator to test the switches on the control panel and the coin door.

Select the Switch Test by using any joystick to highlight the Switch Test option; then, press any control panel button to activate it. The top of the screen shows a layout of the control panel and the bottom of the screen lists the coin door switches. Pressing a switch causes the corresponding switch location on the screen to light. Release the switch and the screen returns to normal.

Press the Player 1 & 2 Start Buttons together to return to the Diagnostic Menu.

DIP SWITCH TEST

The DIP Switch Test allows the operator to check the position of the two 8-position DIP switches on the CPU Board. The operator can also change the setting of each position of each DIP Switch during this mode.

To enter the test, use any joystick to select the DIP Switch Test and any control panel button to activate it. The screen displays a layout of their current settings.

To change a DIP Switch setting, move the switch to the desired setting, then check the screen to verify that the switch now shows the new setting.

Press any control panel button to return to the Diagnostic Menu.

DIP Switch 1 Settings Table (UJ1)

			SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
Coinage										
DIP Switch			Off *							
CMOS			On							
Coin Settings										
USA 1	Ger 1	Fr 1		Off *	Off *	Off *				
USA 2	Ger 2	Fr 2		On	Off	Off				
USA 3	Ger 3	Fr 3		Off	On	Off				
USA 4	Ger 4	Fr 4		On	On	Off				
USA ECA	Ger ECA	Fr ECA		Off	Off	On				
N/U	N/U	N/U		On	Off	On				
N/U	N/U	N/U		Off	On	On				
Free Play	Free Play	Free Play		On	On	On				
Country										
USA							Off *	Off *		
German							On	Off		
French							Off	On		
Not Used							On	On		
Coin Counter Mode:										
One Counter	- Left								Off *	Off *
Two Counters	- Left/Right								On	Off *
One Counter Totalizing	- Left								Off *	On
One Counter	- Left								On	On

NOTE: In Totalizing, the left counter only, calculates the total coinage intake in multiples of the lowest denomination of coin accepted by the various coin chutes.

DIP Switch 2 Settings Table (UJ2)

	SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8
2 Player Kit	Off *							
4 Player Kit	On							
Dollar Bill Validator								
Not Installed		Off *						
Installed		On						
Show Video Clips at Halftime			Off *					
Skip Clips			On					
Not Used				Off *	Off *	Off *		
				On	On	On		
Powerup Test							Off *	
							On	
Test Switch								
Game Mode								Off *
Test Mode								On

* Indicates Factory Setting

CPU Board Test

The CPU Board Test (much like the Start-up Test) allows the operator to check the RAMs and ROMs.

Select the CPU Board Test with any joystick; then, press any control panel button to activate the automatic test of the CPU Board's RAMs and ROMs. When this test is activated, a "rug" pattern appears on the screen. The screen then changes to show the layout of the RAMs and ROMs on the CPU. Any chip that is shown as black with a white outline is part of the CPU and should turn either red or green during the CPU Test. Any chip that is shown as gray with a white outline is not installed in the game. During the test, chips are good, if they turn green; they are faulty, if they turn red.

Sound Board Test

The Sound Test allows listening to some of the sounds that NBA JAM is capable of producing. This test also emits a tone for each fault that is detected. After completion of this test, the main menu will be automatically returned to the viewing screen.

Monitor Patterns
The Monitor Patterns Test provides a menu for testing the monitor. Select the test with any joystick and activate with any control panel button. Once the Monitor Test is activated, move any joystick to select a Monitor Test option; press any control panel button to activate the option.

SELECT WITH ANY STICK
ACTIVATE WITH ANY BUTTON

RED SCREEN

GREEN SCREEN

BLUE SCREEN

COLOR BARS

CROSSHATCH PATTERNS

BACK TO DIAGNOSTICS MENU

RETURN TO MAIN MENU

Monitor Pattern Menu

The **RED, GREEN,** and **BLUE SCREEN** tests fill the screen with either red, green or blue.
The **COLOR BARS** test fills the screen with several gradated colors to help with red, green and blue level adjustments Each color should appear sharp and clear.
The **CROSSHATCH PATTERNS** test fills the screen with a grid and a series of dots. The grid and the dots should be clear. The dots should appear round.

If any of the Monitor Pattern Tests shows a need for adjustment, use the proper white knobs on the Monitor Board.

Use any joystick to select RETURN TO MAIN MENU or BACK TO DIAGNOSTIC MENU and activate with any control panel button.

Run Burn-in Test
The Burn-in Test continually repeats the CPU Board Test. Move any joystick to select the Burn-in Test; then, press any control panel button to activate the test. When the Burn-in Test detects an error, the test stops and displays an error message on the screen. Use this test to find intermittent CPU problems.

To exit this test, switch the game OFF then ON again.

COIN BOOKKEEPING

To enter Coin Bookkeeping from the Main Menu, move any joystick to select the Coin Bookkeeping option; then, press any control panel button to activate it.

The Coin Bookkeeping Table records the coinbox totals and game play counters. The left side of the table names the bookkeeping item; the right side shows the number of coins, credits or plays for each item.

To exit Coin Bookkeeping, move any joystick to select RETURN TO MAIN MENU; then, press any control panel button to activate it.

LEFT SLOT COINS	0
RIGHT SLOT COINS	0
PAID CREDITS	0
TOTAL COLLECTION	$0.00
SERVICE CREDITS	0
TOTAL PLAYS	0
PLAYS UNTIL HIGH SCORE RESET	5000

CLEAR COIN COUNTERS
RETURN TO MAIN MENU

Coin Bookkeeping Table

GAME AUDITS

To enter Game Audits from the Main Menu, move any joystick to select the Game Audits option; then, press any control panel button to activate it. To advance to the next (or return to the previous) page of the Game Audit Table, move any joystick to select either "Next Audit Page" or "Previous Audit Page"; then, press any control panel button to change the page.

The Game Audits Table records the game play statistics. The left side of the table names the Audit item; the right side shows the amount of play.

TOTAL GAME UPTIME (Hrs:Mins)	00:00
TOTAL GAME PLAY TIME (Hrs:Mins)	00:00
GAMES STARTED	0
INDIVIDUAL PLAYER STARTS	0
FULL GAMES PURCHASED	0
1 PLAYER PLAY	0
2 PLAYER PLAY	0
3 PLAYER PLAY	0
4 PLAYER PLAY	0
FINISHED 1ST QUARTER	0
FINISHED 2ND QUARTER	0
FINISHED 3RD QUARTER	0
FINISHED 4TH QUARTER	0
GONE TO OVERTIME	0

NEXT AUDIT PAGE
RETURN TO MAIN MENU

Page 1 of Audit Table

GAME AUDITS Continued

AVERAGE SCORE	0
AVERAGE HUMAN SCORE	0
AVERAGE CPU SCORE	0
AVERAGE WINNING SCORE	0
AVERAGE LOSING SCORE	0
CPU VICTORIES	0
GREATEST CPU VICTORY MARGIN	0
GREATEST CPU LOSS MARGIN	0
SCORE DIFFERENTIAL AT DROPOUT	0
DROPOUTS VS CPU	0
DROPOUTS VS HUMAN	0

PRIVIOUS AUDIT PAGE

RETURN TO MAIN MENU

Page 2 of Audit Table

ATLANTA	0	MILWAUDEE	0
BOSTON	0	MINNESOTA	0
CHARLOTTE	0	NEW JERSEY	0
CHICAGO	0	NEW YORK	0
CLEVELAND	0	ORLANDO	0
DALLAS	0	PHILADELPHIA	0
DENVER	0	PHOENIX	0
DETROIT	0	PORTLAND	0
GOLDEN STATE	0	SACRAMENTO	0
HOUSTON	0	SAN ANTONIO	0
INDIANA	0	SEATTLE	0
L.A. CLIPPERS	0	UTAH	0
L.A. LAKERS	0	WASHINGTON	0
MIAMI	0		

RETURN TO MAIN MENU

PREVIOUS AUDIT PAGE

Page 3 of Audit Table

To exit the Game Audit Table, move any joystick to select RETURN TO MAIN MENU; then, press any control panel button to activate your selection.

GAME ADJUSTMENTS

NOTE: Game Adjustments are explained in more detail on the following page.

Move any joystick to select the Game Adjustment option on the Main Menu; then, press any control panel button to activate it.

The Game Adjustments option allows the owner/operator to change the Game Pricing and Game Difficulty.

The Game Adjustments Menu offer several options. Each option has its own menu. Move any joystick to select an option; then, press any control panel button to activate that option. On the next menu screen, move any joystick to select the item you wish to modify; then, press any control panel button to activate that item. The activated item provides a setting choice. Move any joystick to change the current setting value; then, press any control panel button to lock in the new setting value. Moving the joystick up increases the setting value, moving the joystick down decreases the setting value.

SELECT WITH ANY STICK
PRESS A BUTTON TO MODIFY

RETURN TO MAIN MENU

STANDARD PRICING

CUSTOM PRICING

COIN COUNTER MODE

GAME DIFFICULTY

LIVES PER PLAY

ATTRACT-MODE SOUND

AUTO HIGH SCORE RESET

VIOLENCE LEVEL

COMPUTER ASSISTANCE

RETURN TO MAIN MENU

Game Adjustment Menu

To exit the Adjustments Menu, use any joystick to select RETURN TO MAIN MENU; then, use any control panel button to activate your selection.

Standard Pricing: Standard Pricing allows the operator to choose any of the "Standard" selections for the Standard Pricing Table.

Custom Pricing: Custom Pricing allows the operator to install pricing other than that of the Standard Pricing Table. Custom Pricing also allows the operator to select the amount of credits required to start a game and the amount of credits required to continue a game. This option is adjusted from the Dip Switch Settings.

Coin Counter Mode: This controls the mechanical coin counter mode.

Free Play: This option selects free play. The setting choices for this adjustment are:

-No (factory)
-Yes

Game Difficulty: Game Difficulty allows the operator to select the difficulty level of the game. The settings for the adjustment are:

-Easiest Setting: 1
-Hardest Setting: 5
-Factory Setting: 3

Game Timer Speed: Game Timer allows the operator to control the overall game timer speed. The settings for the adjustment are:

-Slowest Setting: 1
-Fastest Setting: 5
-Factory Setting: 3

Credits for Full Game: Credits for Full Game allows the operator to select the number of credits required to purchase a full game. The settings for the adjustment are:

-Easiest Setting: 4
-Hardest Setting: 16
-Factory Setting: 8

4 Player Win Bonus: Allows the two winners in a four-player game, that was purchased in full by all players at the beginning, to play the next game for free.

Attract-Mode Sounds: Determines whether the game will make sounds in the attract mode. The settings for the adjustment are:

-On
-Off (factory)

Computer Assistance: Computer assistance helps to keep the game scores close. This causes more excitement and as a result, higher earnings. However, if the operator cares to, computer assistance can be disabled. This may be desirable for tournaments, etc.. Computer assistance can also be disabled by the players using secret button combinations

-On
-Off (factory)

Pricing Table

Name	Settings Credit/Coin	Left Chute	Center Chute	Right Chute	Fourth Chute
USA 1	1/25¢ (2 to Start; 2 to Continue)	25¢	$1.00	25¢	
USA 2	1/25¢ (2 to Start; 1 to Continue)	25¢	$1.00	25¢	
USA 3	1/25¢ (1 to Start; 1 to Continue)	25¢	$1.00	25¢	
USA 4	1/50¢, 3/$1.00 (1 to Start; 1 to Continue)	25¢	$1.00	25¢	
USA 5	1/50¢, 4/$1.00 (2 to Start; 1 to Continue)	25¢	$1.00	25¢	
USA 6	1/50¢ (1 to Start; 1 to Continue)	25¢	$1.00	25¢	
USA 7	1/50$, 3/$1.00 (1 to Start; 1 to Continue)	25¢	$1.00	25¢	
USA 8	1/50¢, 4/$1.00 (2 to Start; 2 to Continue)	25¢	$1.00	25¢	
USA ECA	1/25¢, 4/$1.00 (2 to Start; 2 to Continue)	$1.00	.10¢	25$	5¢
German 1	1/1DM, 6/5DM	1 DM		5 DM	
German 2	1/1DM, 7/5DM	1 DM		5 DM	
German 3	1/1DM, 8/5DM	1 DM		5 DM	
German 4	1/1DM, 5/5DM	1 DM		5 DM	
German 5	1/1DM, 6/5DM	1DM		5DM	
German ECA	1/1DM, 2/2DM, 6/5DM	5DM	1DM	2DM	
France 1	2/5F, 5/10F	5 F		10 F	
France 2	2/5F, 4/10F	5 F		10 F	
France 3	1/5F, 3/10F	5 F		10 F	
France 4	1/5F, 2/10F	5 F		10 F	
France 5	2/5F, 5/10F, 11/2 x 10F	5F		10F	
France 6	2/5F, 4/10F, 9/2 x 10F	5F		10F	
France 7	1/5F, 3/10F, 7/2 x 10F	5F		10F	
France 8	1/5F, 2/10F, 5/2 x 10F	5F		10F	
France 9	1/3 x 1F, 2/5F	1F		5F	
France 10	1/2 x 1F, 3/5F	1F		5F	
France 11	1/3 x 1F, 2/5F, 5/2 x 5F	1F		5F	
France 12	1/2 x 1F, 3/5F, 7/2 x 5F	1F		5F	
France ECA	1/3 X 1F, 2/5F, 5/2 X 5F	1F	10F	5F	
Canada	1/2 x 25¢, 3/$1.00	25¢		$1.00	
Swiss 1	1/1F, 6/5F	1F		5F	
Swiss 2	1/1F, 7/5F	1F		5F	
Swiss 3	1/1F, 8/5F	1F		5F	
Italy	1/500 lire	500 lire		500 lire	
UK 1	1/20P, 3/50P	20P		50P	
UK 2	2/20P, 5/50P	20P		50P	
UK ECA	1/20P, 3/50 P, 7/£1.00	£1.00	20P	50P	10P
UK Elec w/CCU	1/30P, 2/50P, 4/£1.00	£1.00		CCU	
Spain 1	1/100 peseta, 6/500 peseta	100 peseta		500 peseta	
Spain 2	1/100 peseta, 5/500 peseta	100 peseta		500 peseta	
Australia 1	1/3 x 20¢, 2/$1.00	20¢		$1.00	
Australia 2	1/5 x 20¢, 1/$1.00	20¢		$1.00	
Japan 1	1/100 yen	100 yen		100 yen	
Japan 2	2/100 yen	100 yen		100 yen	
Austria 1	1/5 schilling, 2/10 schilling	5 schilling		10 schilling	
Austria 2	1/2 x 5 schilling, 3/2 x 10 schilling	5 schilling		10 schilling	
Belgium 1	1/20F	20F		20F	
Belgium 2	3/20F	20F		20F	
Belgium 3	2/20F	20F		20F	
Belgium ECA	1/20F	50F	5F	20F	
Sweden	1/3 x 1 krona, 2/5 krona	1 krona		5 krona	
New Zealand 1	1/3 x 20¢	20¢		20¢	
New Zealand 2	1/2 x 20¢	20¢		20¢	
Netherlands	1/1HFl, 3/2.5HFl	1HFl		2.5HFl	
Finland	1/1 markka	1 markka		1 markka	
Norway	1/2 x 1 krone, 3/5 x 1 krone	1 krone		1 krone	
Denmark	1/2 x 1 krone, 3/5 krone, 7/2 x 5 krone	1 krone		5 krone	
Antillies	1/25¢, 4/1 guilder	25¢		1 guilder	
Hungary	1/2 x 10 forint, 3/2 x 20 forint	10 forint		20 forint	

Custom Pricing

SELECT WITH ANY STICK
PRESS A BUTTON TO MODIFY

RETURN TO ADJUSTMENTS MENU

(1) LEFT CHUTE (1) UNITS

(1) RIGHT CHUTE (2) UNITS

(1) CHUTE (3) UNITS

(1) CHUTE (4) UNITS

(2) UNITS/CREDIT

(3) UNITS/BONUS

(4) MINIMUM UNITS REQUIRED

(5) CREDITS TO START

(6) CREDITS TO CONTINUE

(7) COIN PAGE HELP

(8) SHOW CREDIT FRACTIONS

(9) COINS PER DOLLAR

(10) MAXIMUM CREDITS

(1) Coins inserted accumulate units. This adjustment specifies the number of units given for each coin in the fourth chute (see "units/credit")
(2) This is the number of coin units required to buy one credit.
(3) One bonus credit is awarded after this many coin units have accumulated.
(4) No credits will be awarded until this many coin units have accumulated.
(5) Each player needs this many credits to begin a game.
(6) Each player needs this many credits to continue a game.
(7) Whenever standard pricing is used, a corresponding message is displayed on the credits screen. Setting this to no disables the message.
(8) When set to yes, fractional credits will be seen on the credits screen.
(9) The detailed bookkeeping screen shows total collections based on this many coins per dollar. (Set to zero to disable the display of money totals.)
(10) This is the limit for the credits counter. Additional coins inserted will be lost. Factory setting is 30.

UTILITIES

Move any joystick to select the Utilities option on the Main Menu; then, press any control panel button to activate it.

The Utilities Menu allows the owner/operator to clear the games bookkeeping memory and to install a custom message.

SELECT WITH ANY STICK
ACTIVATE WITH ANY BUTTON

CLEAR CREDITS

CLEAR COIN COUNTERS

CLEAR GAME AUDITS

CLEAR PLAYER RECORDS

RESET HIGH SCORE

DEFAULT ADJUSTMENTS

FULL FACTORY RESTORE

RETURN TO MAIN MENU

Utilities Menu

Move any joystick to select an item from the Utilities Menu; then, press any control panel button to activate that item. After an item has been activated, you are given the option of resetting that item or not. For example:

CLEAR CREDITS?
ARE YOU SURE?

YES
NO

Move any joystick to choose YES or NO; then, press any control panel button to lock your choice and to return to the Utilities Menu.

To exit the Utilities Menu, move any joystick to select RETURN TO MAIN MENU; then, press any control panel button to activate your selection.

Troubleshooting

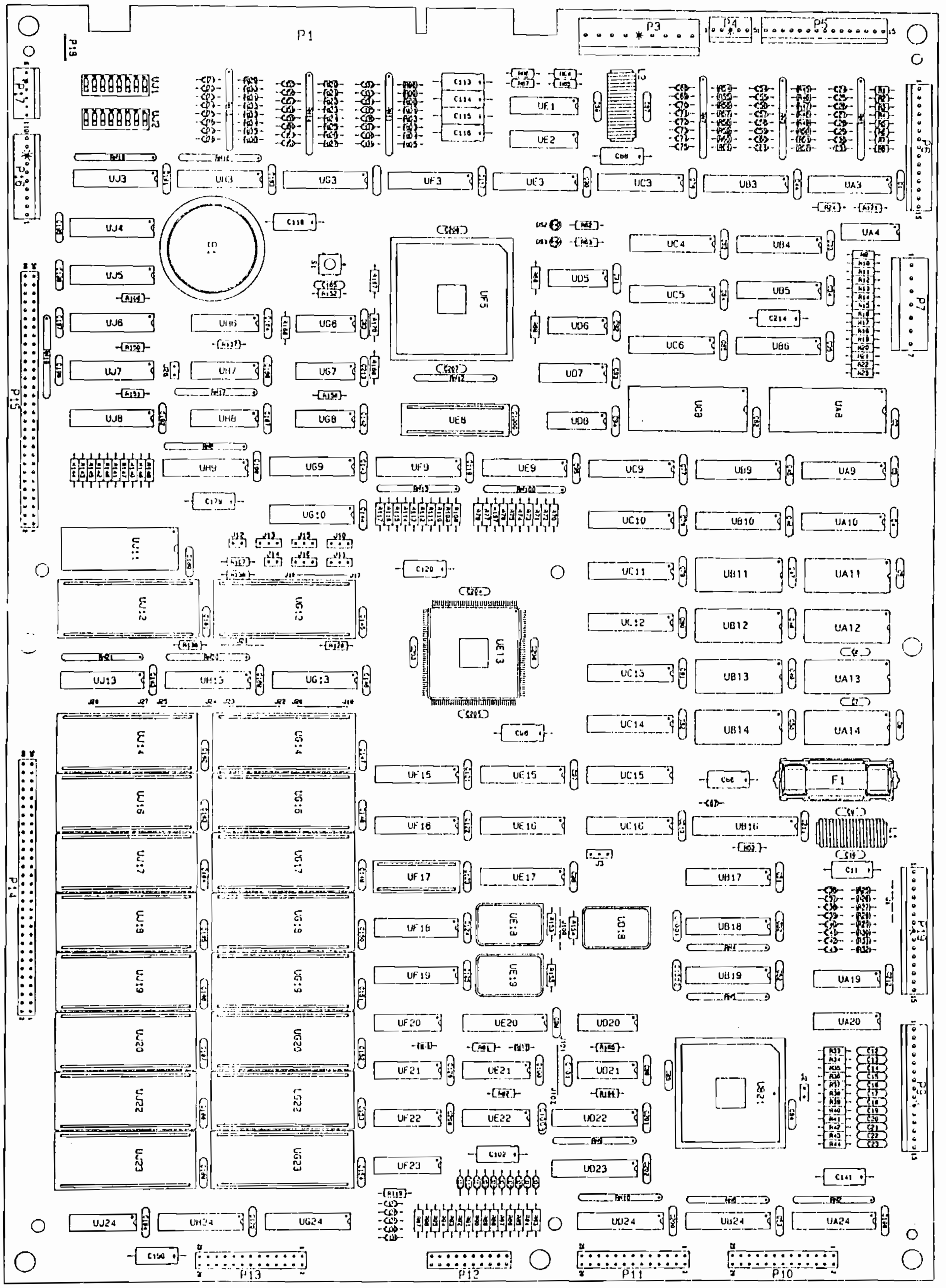
PROBLEM	POSSIBLE SOLUTION
NO PICTURE OR DISTORTED PICTURE.	Check for faulty CPU board or monitor. Check for disconnected video signal cable.
TURN GAME ON & NOTHING HAPPENS.	Check line fuse. Check for +5Vdc at pins C, D, 3, and 4 of the JAMMA Connector.
NO SOUND.	Check the speaker and speaker connection to pins L and 10 on the JAMMA Connector. Check volume control setting. Check for +12Vdc at pins F and 6 on the JAMMA Connector. Check interboard wiring from CPU Board to the Sound Board. Be sure the red lin on the ribbon cable is connected to pin 1 on both boards.
MOVE JOYSTICK, AND PLAYER MOVES IN THE WRONG DIRECTION.	Check for open wires between the joystick and CPU board. Check for contamination on the joystick switch contacts and the CPU board pins. Check for proper ground.
PRESS START BUTTON/BOMB BUTTON AND NOTHING HAPPENS.	A joystick switch is wired wrong. Check the JAMMA Chart, the Control Panel Wire List, or the Cabinet Wiring Diagram.
NO CREDIT GIVEN WHEN COINS ARE INSERTED.	Check for open wires between the pushbutton switch and CPU board. Check for contamination on the CPU board pins or the pushbutton switch contacts. Check for proper ground. Be sure pushbutton switches are wired correctly.
TOO MANY CREDITS FOR NUMBER OF COINS INSERTED.	Check DIP Switch coin setting. Check for contamination on the coin switch contacts. Check for an open wire between coin switch 1 and pin 16 on the JAMMA connector or coin switch 2 and pin T of the JAMMA connector.
GAME STAYS IN THE TEST MODE.	Check that switch #8 on DIP Switch #2 is OFF. If you have installed an optional Test Switch be sure it is set to OFF. Be sure the DIP Switch and optional Test Switch are not shorted to ground. You can use the DIP Switch Test to prove this. If the switch shows as closed during the DIP Switch Test but is set in the open position, then the switch is some how shorted to ground.

NBA JAM Kit

SECTION
TWO

Parts Information

A-14816-40023
CPU Board Assembly



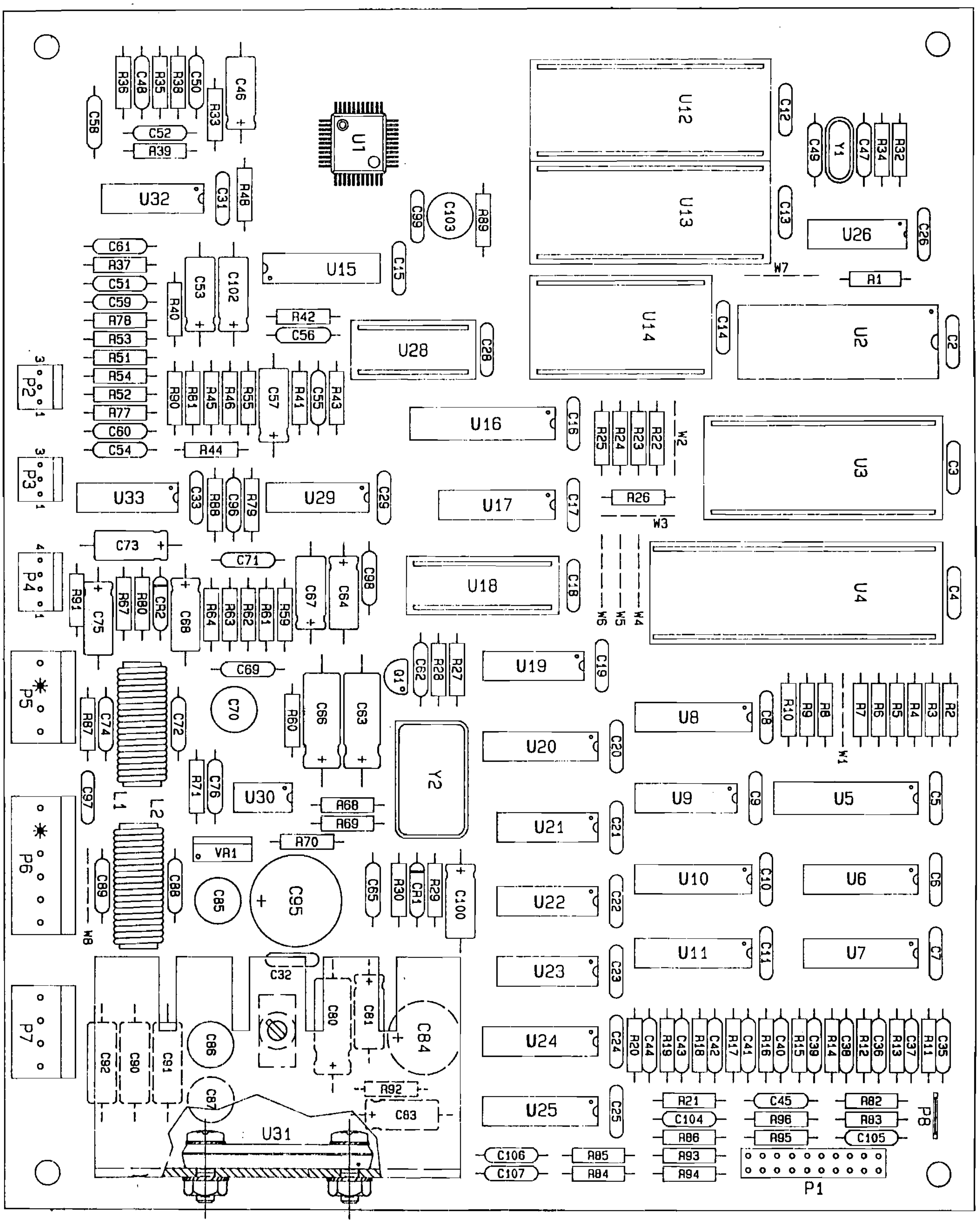
A-14816-40023
CPU Board Parts

Part Number	Part Designator	Description
5880-11056-00	B1	Battery, Lithium 3.0V
5434-12255-00	UH6	MAX691
5370-12602-00	UE1	ULN2064
5340-12958-00	UE22, UF22, UF23	26LS31
5340-12959-00	UE21, UF20, UF21	26LS32A
5340-13322-00	UA8, UC8	5C2568
5283-10551-00	UG8	74F00
5283-10552-00	UD6	74F04
5281-09215-00	UD8	74LS04
5280-09309-00	UA4	7407
5283-12488-00	UG6	74F08
5281-09500-00	UD20, UG7	74LS32
5321-13466-00	UD21	74AC74
5281-09737-00	UD5	74LS86
5281-09745-00	UH8	74LS138
5281-13438-00	UH7	74LS155A
5281-09733-00	UE2	74LS174
5320-13437-00	UD22	74ACTQ244
5283-12890-00	UB24, UD23	74F244
5281-09867-00	UG9	74LS244
5320-13436-00	UB18, UB19	74ACTQ245
5283-12889-00	UA24, UD24	74F245
5283-13319-00	UD7	74F253
5283-13320-00	UB9, UF9, UF18, UG10	74F373
5317-12211-00	UB4, UC4	74ALS541
5010-13372-00	R81	220 Ω Res. 5%, 1/8W
5010-13371-00	R62-R67	330 Ω Res. 5%, 1/8W
5040-09343-00	C11, C66, C88, C96, C102, C113-C116, C118, C120, C141, C179, C190, C214	10uF Cap., 20V
5019-09362-00	RN1-RN3, RN6, RN7, RN9-RN12, RN14-RN18, RN100	4.7K Ω Res SIP, 5%, 1/8W
5521-13424-01	UD18	50MHz Oscillator
5645-09025-00	SW1, SW2	DIP, 8-switch
5317-12208-00	UB6, UC6, UC11, UC12, UC13, UC14, UE15, UE16, UF15, UF16, UH9, UH13, UJ8, UJ13	74ALS245
5010-13363-00	R24, R69, R82-R97, R119, R128, R137, R148, R151, R171	100 Ω Res. 5%, 1/8W
5010-13366-00	R1-R8, R45-R52, R54-R61, R98-R105, R118, R120-R127, R129-R136, R172	470 Ω Res. 5%, 1/8W
5043-08980-00	C1-C4, C9, C10, C32-C35, C44-C46, C51-C53, C62-C65, C76-C86, C90-C95, C97-C101, C117, C119, C121-C126, C140, C142-C154, C163, C164, C166-C170, C180-C189, C191-C194, C199-C213, C1000	.01uF Cap.,
5400-12220-00	UB21	TMS34010-50
A-16217	UE8	20L8
5410-13508-00	UF5	1020A-1
A-16093	UF17	16L8
5340-13321-00	ua11-ua14, ub11-ub14	48121ic, 80nSEC
5410-12862-00	UE13	DMA2
5340-13020-00	UJ4, UJ5, UJ6, UJ7	44C256
5340-12558-00	UJ11	5565

Part Number	Part Designator	Description
5010-13369-00	R10, R17, R22	8.2K Ω Res. 5%, 1/8W
5010-13370-00	R9, R18, R23	15K Ω Res. 5%, 1/8W
5048-11030-00	C165	470pF Cap., 10%
5048-11031-00	C87, C89	.001uF Cap., 10%
5671-09019-00	DS2, DS3	LED, Red
5551-09822-00	L2	4.7uH Coil, 3.0A
5881-12315-00	B1	Battery Holder
5700-09915-00	UF17	20 Pin Socket
5700-12047-00	UE8	24 Pin Socket
5700-12253-00	UB21	68 Pin Socket
5700-12424-00	UF5	84 Pin Socket
5791-12461-05	P4	5 Pin Header
5791-12461-06	P17	6 Pin Header
5791-12461-15	P5, P6	15 Pin Header
5791-10862-09	P3	9 Pin Header
5791-09437-00	P12	20 Pin Header
5019-09669-00	RN4, RN5, RN13	1K Ω Res. 5%, 1/8W
5010-13472-00	J100, J101	47 Ω Res. 5%, 1/8W
5010-13473-00	R155	39 Ω Res. 5%, 1/8W
5010-13474-00	R158, R167-R170	68 Ω Res. 5%, 1/8W
5010-09534-00	J18, J19, J22, J24, J28, R154	0 Ω Res. Jumper
5010-13362-00	R12, R15, R20	2K Ω Res. 2%, 1/8W
5010-13368-00	R11, R16, R21	3.9K Ω Res. 5%, 1/8W
5281-12887-00	UE9, UH3, UJ3	74LS541
5521-13424-03	UE19	8MHz Oscillator
5048-13375-00	C54-C61, C67-C75, C103-C112, C127-C139, C155-C162, C171-C178	100pF Cap.,10%
5010-13365-00	R53, R107, R138, R139, R152, R157, R165, R166	4.7K Ω Res. 5%, 1/8W
5010-13361-00	R13, R14, R19	1K Ω Res. 2%, 1/8W
5315-13435-00	UA3, UB3, UC3, UE3, UF3, UG3	74HCT541
5010-13364-00	R70-R77, R79, R106, R108-R117, R140-R147, R149, R150	33 Ω Res. 5%, 1/8W
5281-09486-00	UA9, UA10, UB5, UB10, UC5, UC9, UC10, UC15, UC16, UE17, UE20, UF19, UG13	74LS374
5043-08996-00	C5-C8, C47-C50, C195-C198, C1001-C1003	.1uF Cap., 20%
5700-12088-00	UG12, UG14, UG16-UG20, UG22, UG23, UJ12, UJ14, UJ16-UJ20, UJ22, UJ23	32 Pin Socket
A-5343-40023-18	UG12	E PROM
A-5343-40023-1	UG14	E PROM
A-5343-40023-5	UG16	E PROM
A-5343-40023-9	UG17	E PROM
A-5343-40023-13	UG18	E PROM
A-5343-40023-3	UG19	E PROM
A-5343-40023-7	UG20	E PROM
A-5343-40023-11	UG22	E PROM
A-5343-40023-15	UG23	E PROM
A-5343-40023-17	UJ12	E PROM
A-5343-40023-2	UJ14	E PROM
A-5343-40023-6	UJ16	E PROM
A-5343-40023-10	UJ17	E PROM
A-5343-40023-14	UJ18	E PROM
A-5343-40023-4	UJ19	E PROM
A-5343-40023-8	UJ20	E PROM
A-5343-40023-12	UJ22	E PROM

Notes: 1. See Section 3 For Schematic; .2 * = Not for individual sale.

A-14732-40023
Sound Board Assembly



A-14732-40023
Sound Board Parts

Part Number	Part Designator	Description
5340-12958-00	U7, U11, U24	IC, 26LS31
5340-12959-00	U6, U10, U25	IC, 26LS32
5281-09850-00	U19	IC, 74LS11
5281-09215-00	U26	IC, 74LS04
5281-09851-00	U21	IC, 74LS14
5281-09487-00	U9, U22, U23	IC, 74LS74
5281-09745-00	U8	IC, 74LS138
5281-09246-00	U20	IC, 74LS139
5281-09733-00	U17	IC, 74LS174
5281-09486-00	U5, U16	IC, 74LS374
5340-12278-00	U2	IC, 2064 Static RAM
5370-12260-00	U30	IC, 3340 Attenuator
5370-12960-00	U29	IC, LM324 OP Amp
5370-12730-00	U32, U33	IC, TL084 OP Amp
5371-12727-00	U15	AD7524 DAC
5370-13308-00	U31	MB3731 Audio Amp.
5521-10931-00	Y2	8Mhz Oscillator
5520-09020-00	Y1	3.58Mhz Crystal
5010-09534-00	W2, W3, W5, W7, W8	0Ω Resistor
5010-09039-00	R89	10Ω Res., 5%, 1/4W
5010-10170-00	R11-R21, R93-R96	47Ω Res., 5%, 1/4W
5010-09036-00	R4, R30, R90	100Ω Res., 5%, 1/4W
5010-09187-00	R27	150Ω Res., 5%, 1/4W
5010-09160-00	R82	220Ω Res., 5%, 1/4W
5010-09416-00	R32, R34, R41, R83	470Ω Res., 5%, 1/4W
5010-09358-00	R43, R68	1KΩ Res., 5%, 1/4W
5010-08998-00	R22-R24, R26, R59, R61	2.2KΩ Res., 5%, 1/4W
5010-08983-00	R28	3.3KΩ Res., 5%, 1/4W
5010-10000-00	R87	3.9KΩ Res., 5%, 1/4W
5010-08991-00	R1-R3, R5-R10, R25, R84-R86, R91	4.7KΩ Res., 5%, 1/4W
5010-09219-00	R69	8.2KΩ Res., 5%, 1/4W
5010-09034-00	R35, R36, R38, R39, R62, R63, R67, R70, R80	10KΩ Res., 5%, 1/4W
5010-09269-00	R64	12KΩ Res., 5%, 1/4W
5010-09324-00	R88	27KΩ Res., 5%, 1/4W
5010-09035-00	R29, R53, R81	47KΩ Res., 5%, 1/4W
5010-10987-00	R77, R78	56KΩ Res., 5%, 1/4W
5010-10650-00	R45, R51	62KΩ Res., 5%, 1/4W
5010-08776-00	R71	68KΩ Res., 5%, 1/4W
5010-13215-00	R54	200Ω Res., 5%, 1/4W
5010-12927-00	R79	82KΩ Res., 5%, 1/4W
5010-09162-00	R33, R48, R55, R60, R92	100KΩ Res., 5%1/4
5010-09134-00	R40, R44, R46, R52	150KΩ Res., 5%, 1/4W
5010-12964-00	R37, R42	820KΩ Res., 5%, 1/4W
5048-11027-00	C59, C60	33pF Cap., 10%
5043-10264-00	C62	68pF Cap., 10%
5043-09492-00	C35-C45, C47, C49, C98, C104-C107	100pF Cap., 10%
5048-12748-00	C54, C61, C96	220pF Cap., 10%
5048-11030-00	C71	470pF Cap., 10%
5048-11031-00	C55, C76	1000pF Cap., 10%
5048-11065-00	C69	2200pF Cap., 10%
5048-11080-00	C52, C58	6800pF Cap., 10%
5048-11072-00	C48, C50, C51, C56	3300pF Cap., 10%

Part Number	Part Designator	Description
5043-08980-00	C2-C26, C28, C29, C31-C33, C97, C99	.01uF Cap.
5045-12926-00	C90-C92	.1uF Cap., 10%
5043-08996-00	C72, C74, C88, C89	.1uF Cap., 20%
5048-12036-00	C65	.22uF Cap., 20%
5040-09365-00	C68	1uF, Cap.,
5040-09343-00	C46, C53, C57, C64, C67, C73, C75, C81 C83, C100, C102	10uF Cap., 20V, 20%
5040-09332-00	C63, C66, C80	47uF Cap., 25V
5040-09421-00	C70, C85-C87, C103	100uF Cap., 25V
5040-09506-00	C84	220u0F Cap., 16V
5040-12314-00	C95	2200uF Cap., 25V
5070-08919-00	CR1	1N4148 Diode
5075-13409-00	CR2	Diode, 1N5232
5160-12891-00	Q1	MPS3646 Trans.
5551-09822-00	L1, L2	4.7uH Inductor, 3A
5371-11087-00	U28	YM 3012 D/A IC
5700-09915-00	U18	20-pin Socket
5370-11086-00	U14	YM 2151 SND GEN IC
5400-10320-00	U4	6809E MPU IC
5700-12088-00	U3, U12, U13	32-pin Socket
5791-10862-04	P5, P7	4-pin Header
5791-10872-06	P6	6-pin Socket
5791-09437-00	P1	20-pin Header
01-10516		Heat Sink
4406-01128-00		6-32 Hex Nut
4006-01003-00		6-32 x 3/8 P-PH-S
20-9690-18		Spacer
A-5343-40023-19	U3	IC, EPROM Assy
A-5343-40023-20	U12	IC, EPROM Assy
A-5343-40023-21	U13	IC, EPROM Assy
5460-12743-00	VR1	7809
5400-10320-00	U4	68B09E MPU
5371-11087-00	U28	YM3012 D/A CONV
5370-11086-00	U14	YM2151 Sound Gen.
03-8338-1	Mtg. Spacer 1/4"	
A-16422	U18	IC, PLD Sound
5433-12962-00	U1	IC, OKI6295, 4 Chanel

Notes: 1. See Section 3 For Schematic; 2. * = Not for individual sale.

Notes...

NBA JAM Kit

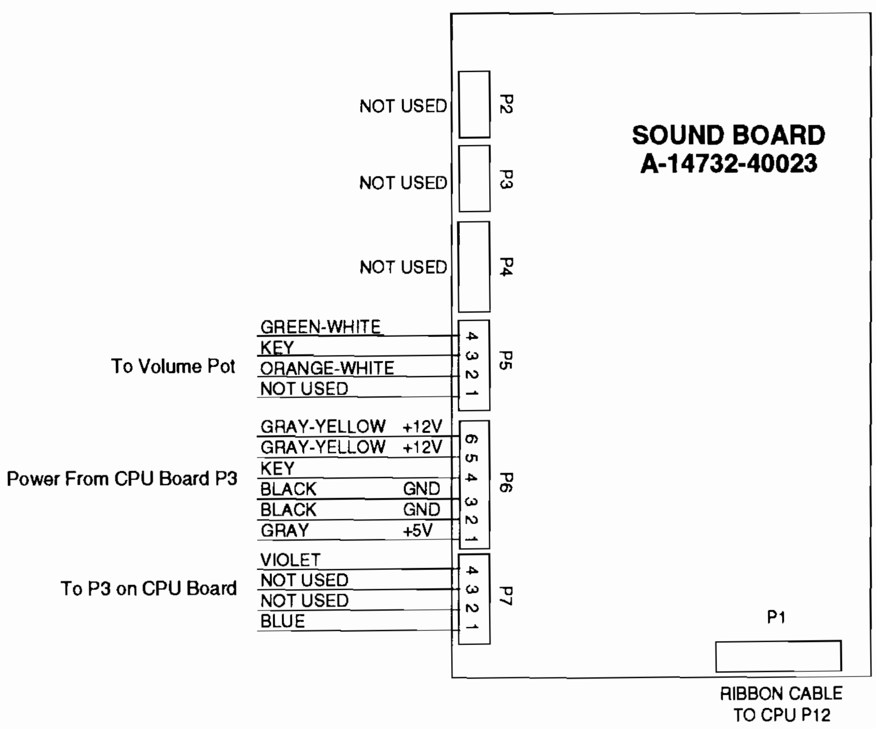
SECTION
THREE

Schematics & Diagrams

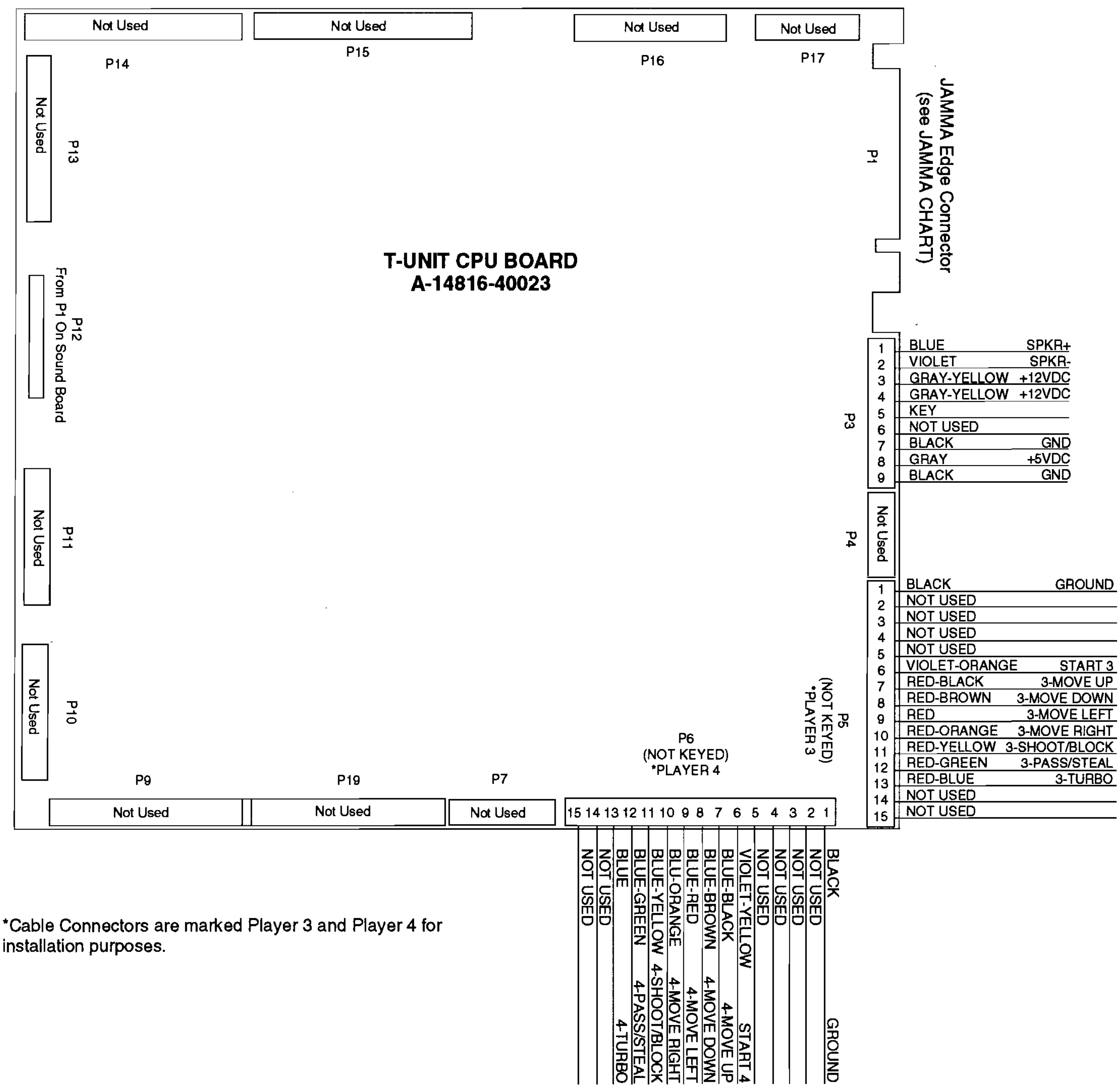
JAMMA CHART

Function	Wire Color	Pin	Pin	Wire Color	Function
Ground	Black	1	A	Black	Ground
Ground	Black	2	B	Black	Ground
+5 Volts DC	Gray	3	C	Gray	+5 Volts DC
+5 Volts DC	Gray	4	D	Gray	+5 Volts DC
-5 Volts DC	Gray-Green	5	E	Gray-Green	-5 Volts DC
+12 Volts DC	Gray-Yellow	6	F	Gray-Yellow	+12 Volts DC
	Key	7	H	Key	
Counter 1	White-Orange	8	J	White-Green	Counter 2
	NC	9	K	NC	
Speaker (+)	Red-Violet	10	L	Green-Violet	Speaker (-)
	NC	11	M	NC	
Video Red	Red	12	N	Green	Video Green
Video Blue	Brown	13	P	White	Video Sync
Video Ground	Shield	14	R	White-Red	Service Credit
Test	Green	15	S	White-Violet	Slam Tilt
1 Coin	White-Blue	16	T	Yellow-White	2 Coin
1 Start	Yellow-Green	17	U	Yellow-Blue	2 Start
1 Up Move	Orange-Black	18	V	Yellow-Black	2 Up Move
1 Down Move	Orange-Brown	19	W	Yellow-Brown	2 Down Move
1 Left Move	Orange-Red	20	X	Yellow-Red	2 Left Move
1 Right Move	Orange	21	Y	Yellow-Orange	2 Right Move
1 Push 1 (Shoot/Block)	Orange-Yellow	22	Z	Yellow-Violet	2 Push 1 (Shoot/Block)
1 Push 2 (Pass/Steal)	Orange-Green	23	a	Yellow-Gray	2 Push 2 (Pass/Steal)
1 Push 3 (Turbo)	Orange-Blue	24	b	Violet-Black	2 Push 3 (Turbo)
Not Used	Orange-Violet	25	c	Violet-Brown	Not Used
Not Used	NC	26	d	NC	Not Used
Ground	NC	27	e	NC	Ground
Ground	Black	28	f	Black	Ground

INTERBOARD WIRING

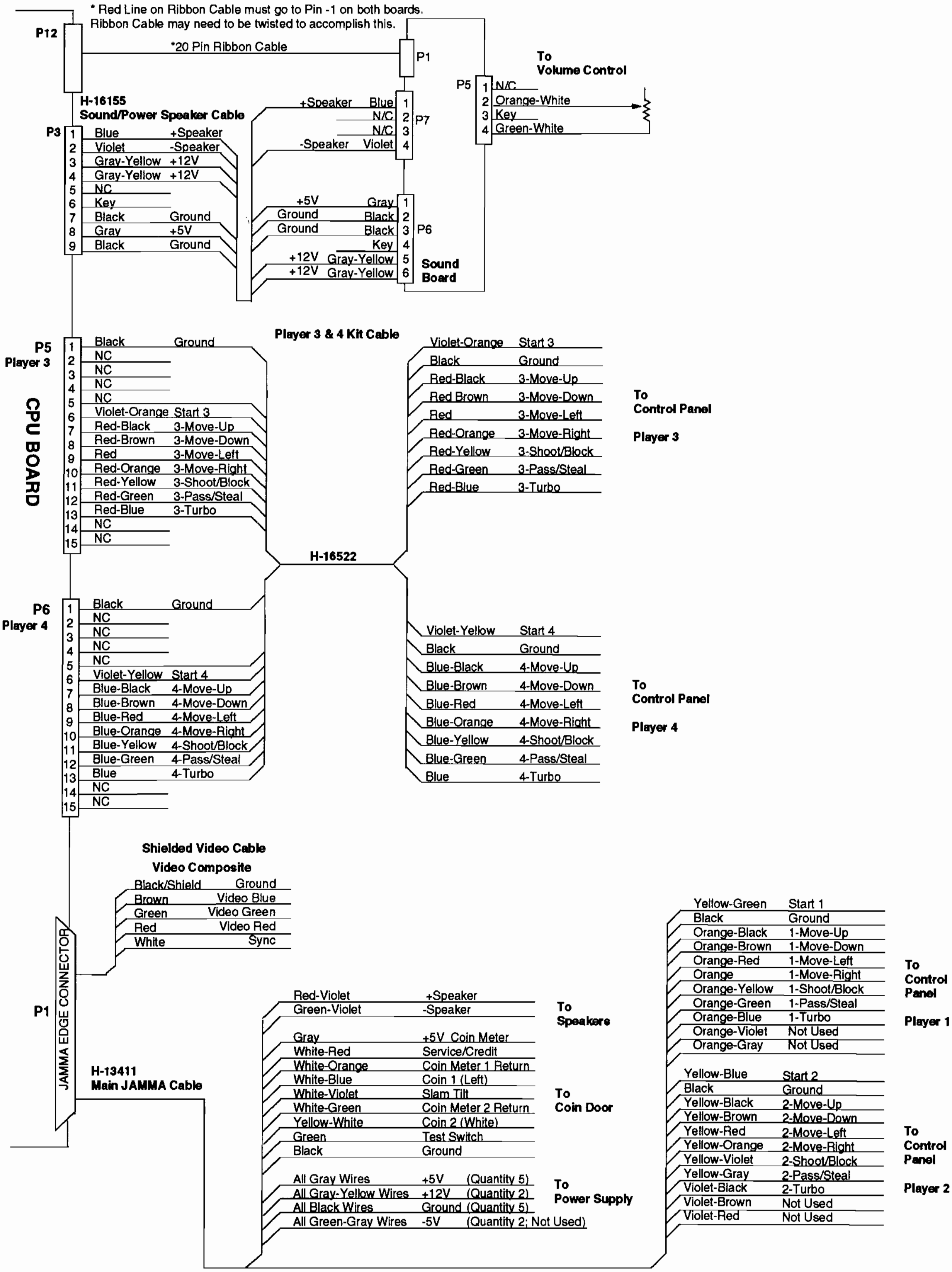


INTERBOARD WIRING



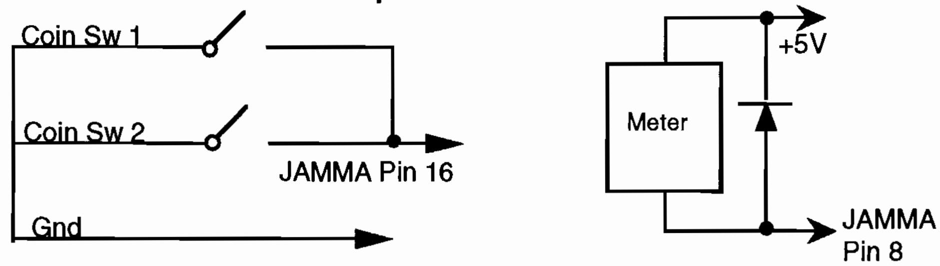
*Cable Connectors are marked Player 3 and Player 4 for installation purposes.

TYPICAL CABINET WIRING DIAGRAM

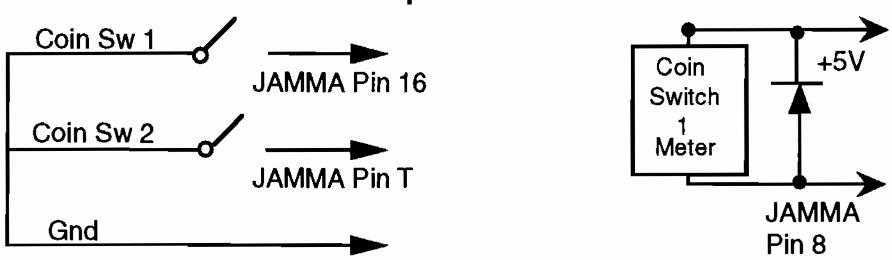


COIN SWITCH AND METER WIRING

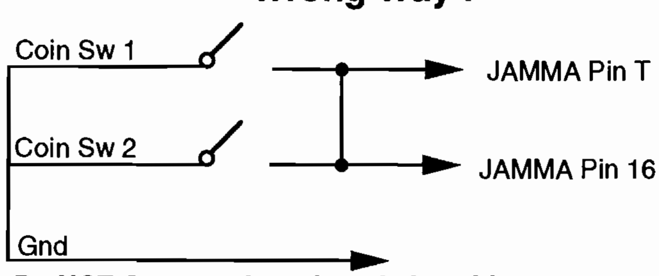
Option 1



Option 2



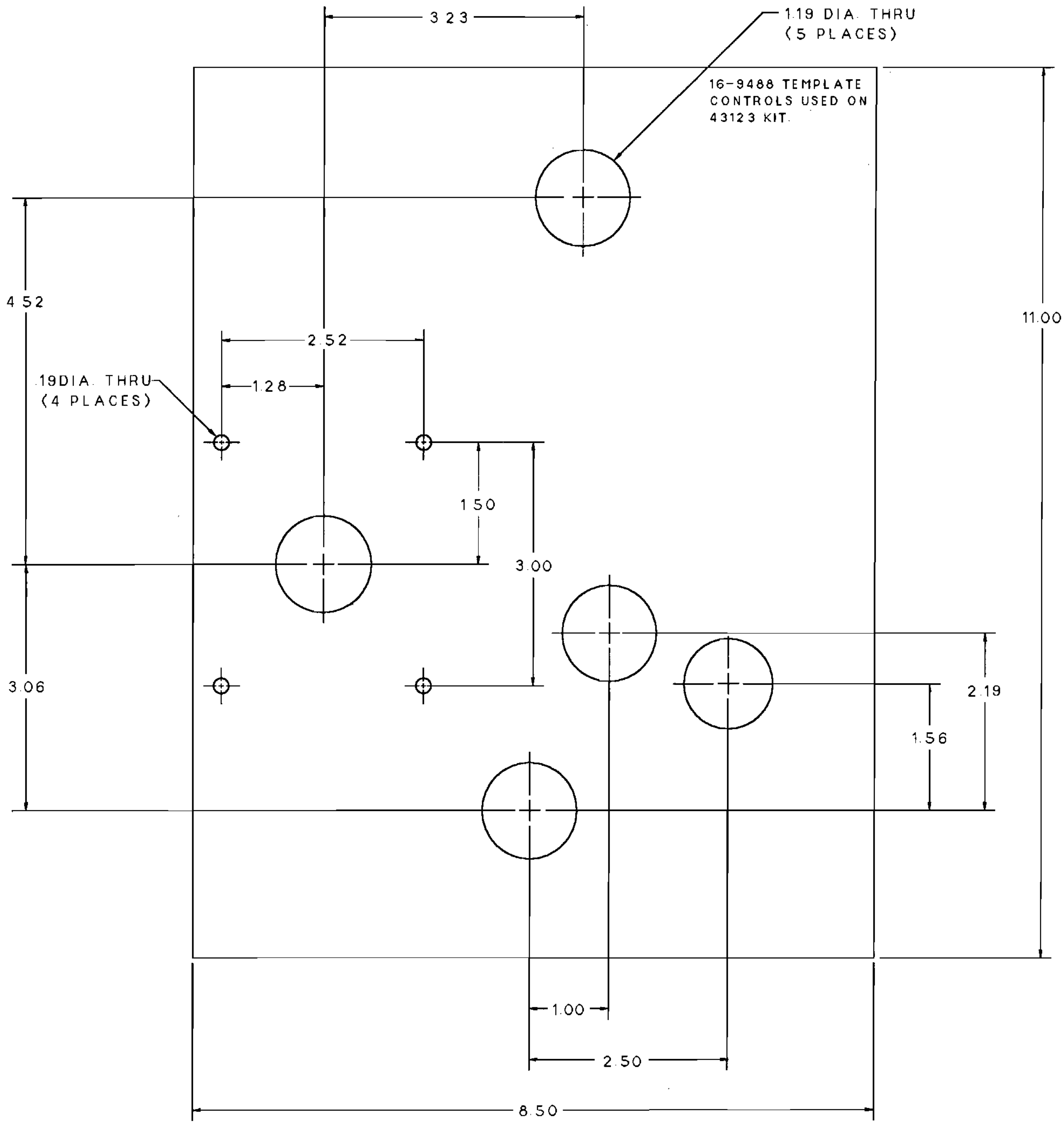
Wrong Way !

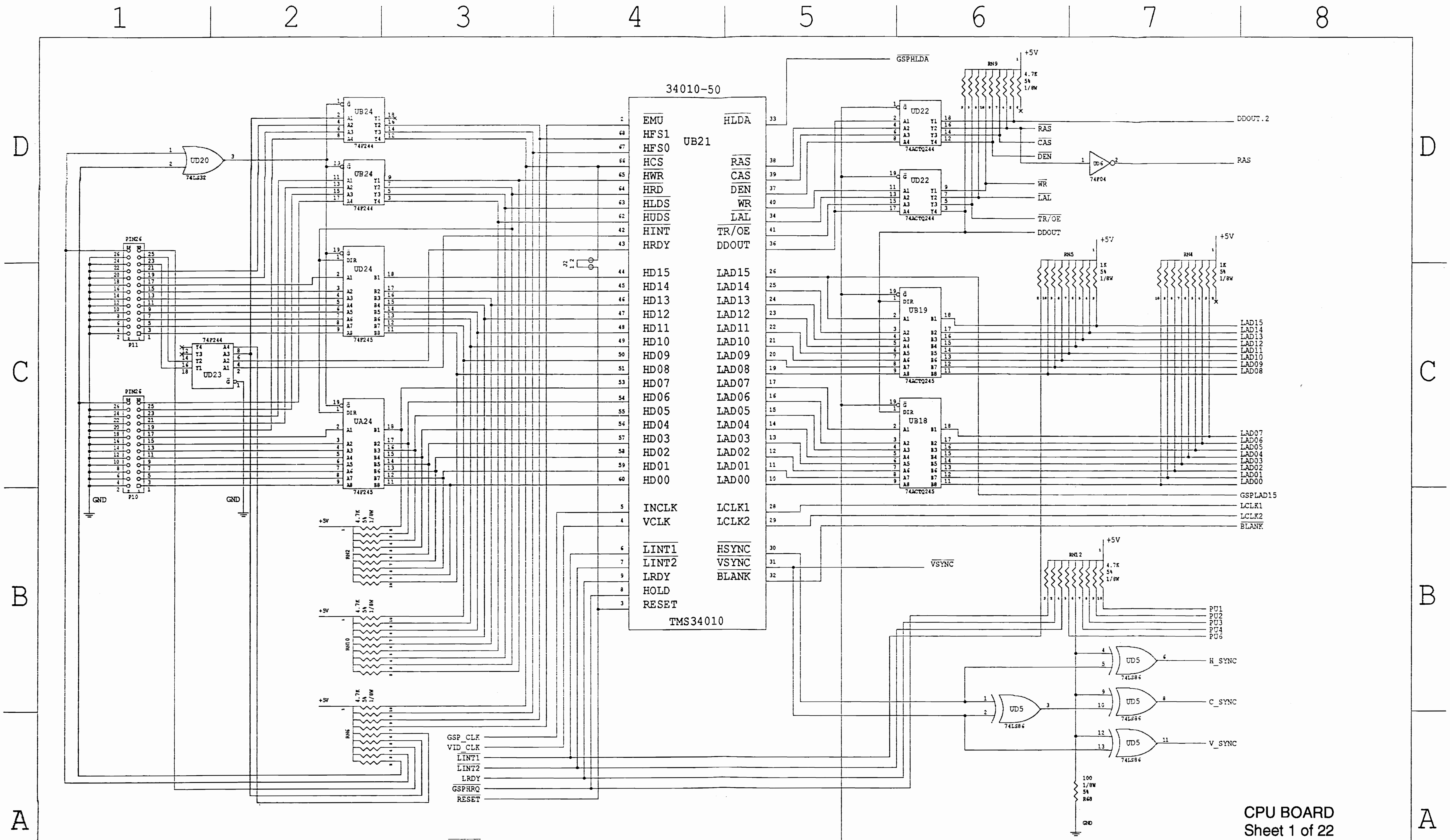


Do NOT Connect the coin switches this way.
This Circuit is INCORRECT and will cause twice as many credits per coin.

CONTROL PANEL TEMPLATE

(shown smaller than actual size)

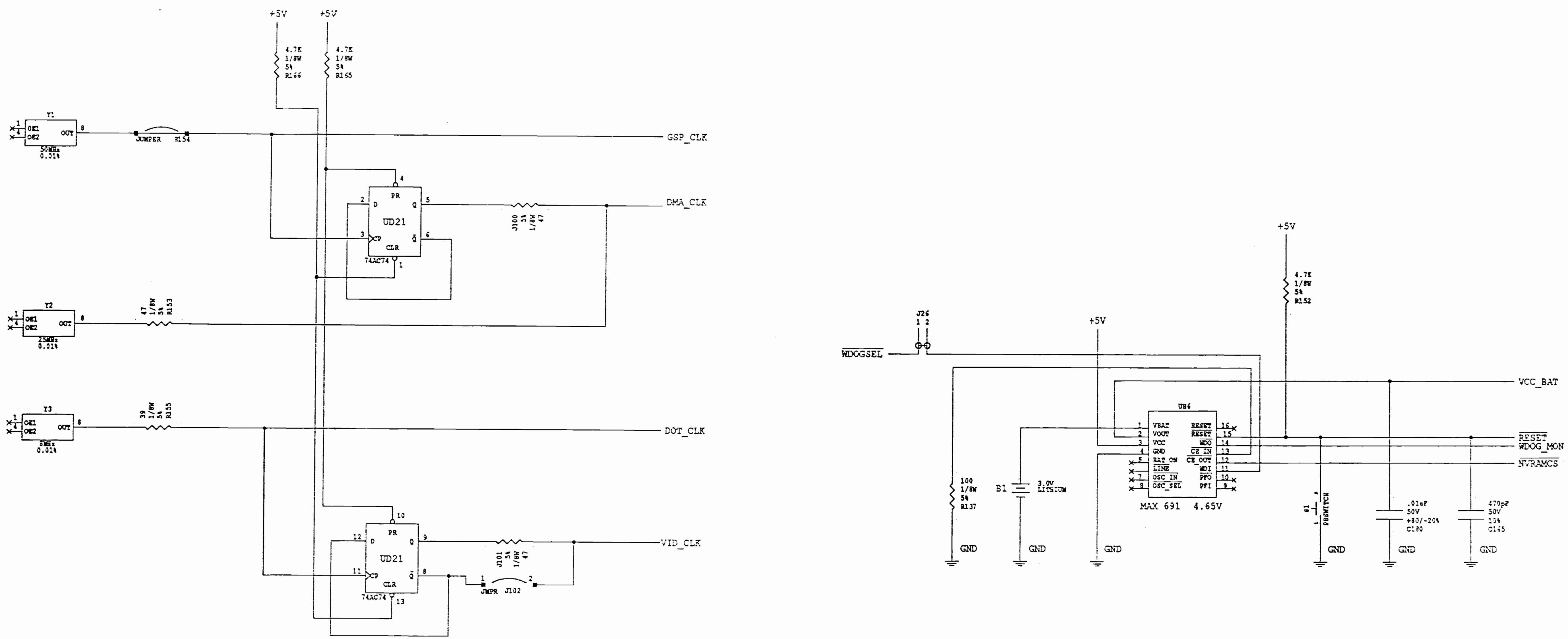




CPU BOARD
Sheet 1 of 22

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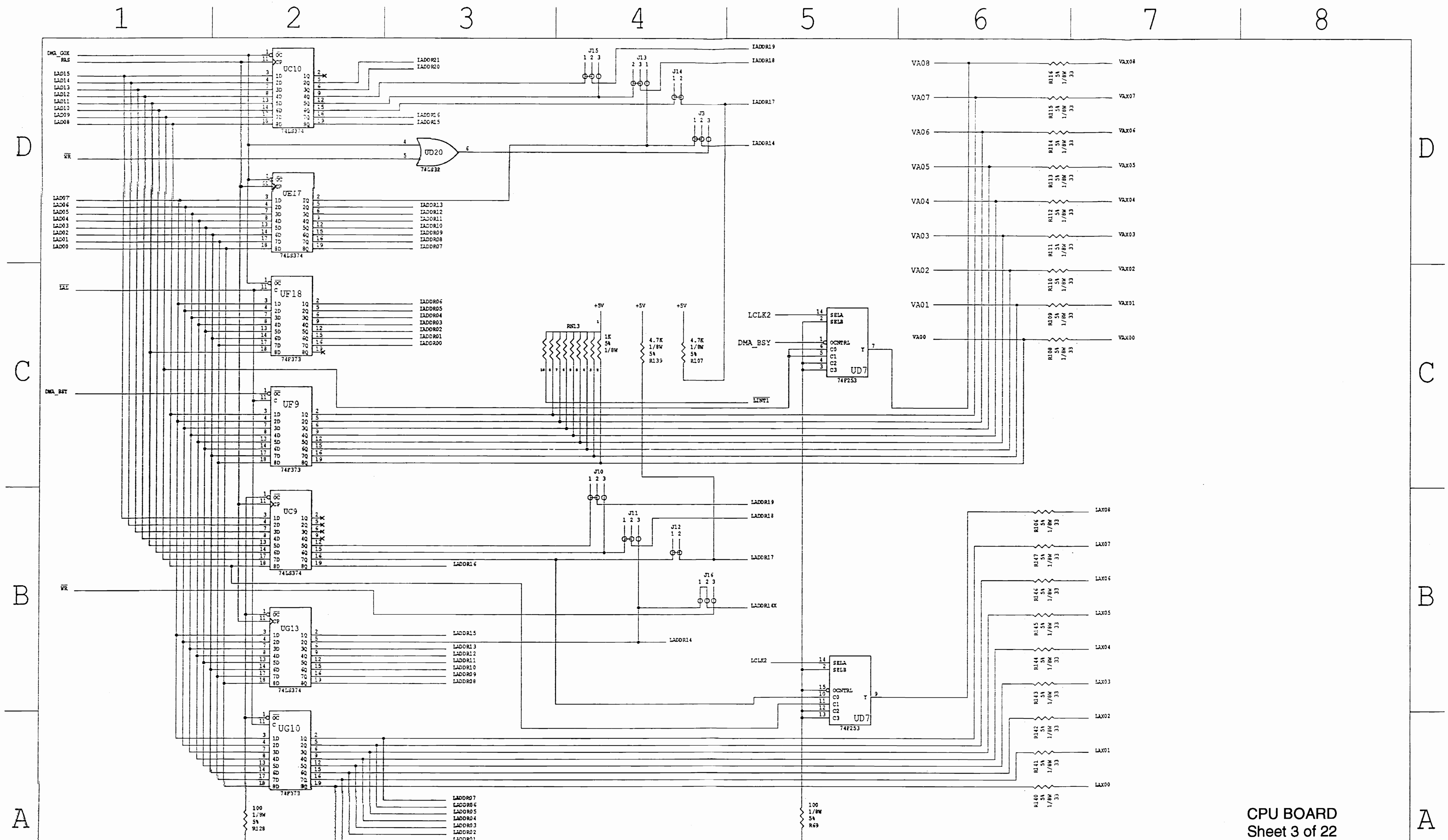
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DWN. BY REM DATE	FIRST USAGE A-14816 DATE 09DEC92	TITLE 34010 PROCESSOR
CHECKED DATE	CURRENT PROJECT 40023 DATE 09DEC92	
APPROVED DATE	SHEET 01 OF 22	PART NO. 16-9423 REV. -



CPU BOARD
Sheet 2 of 22

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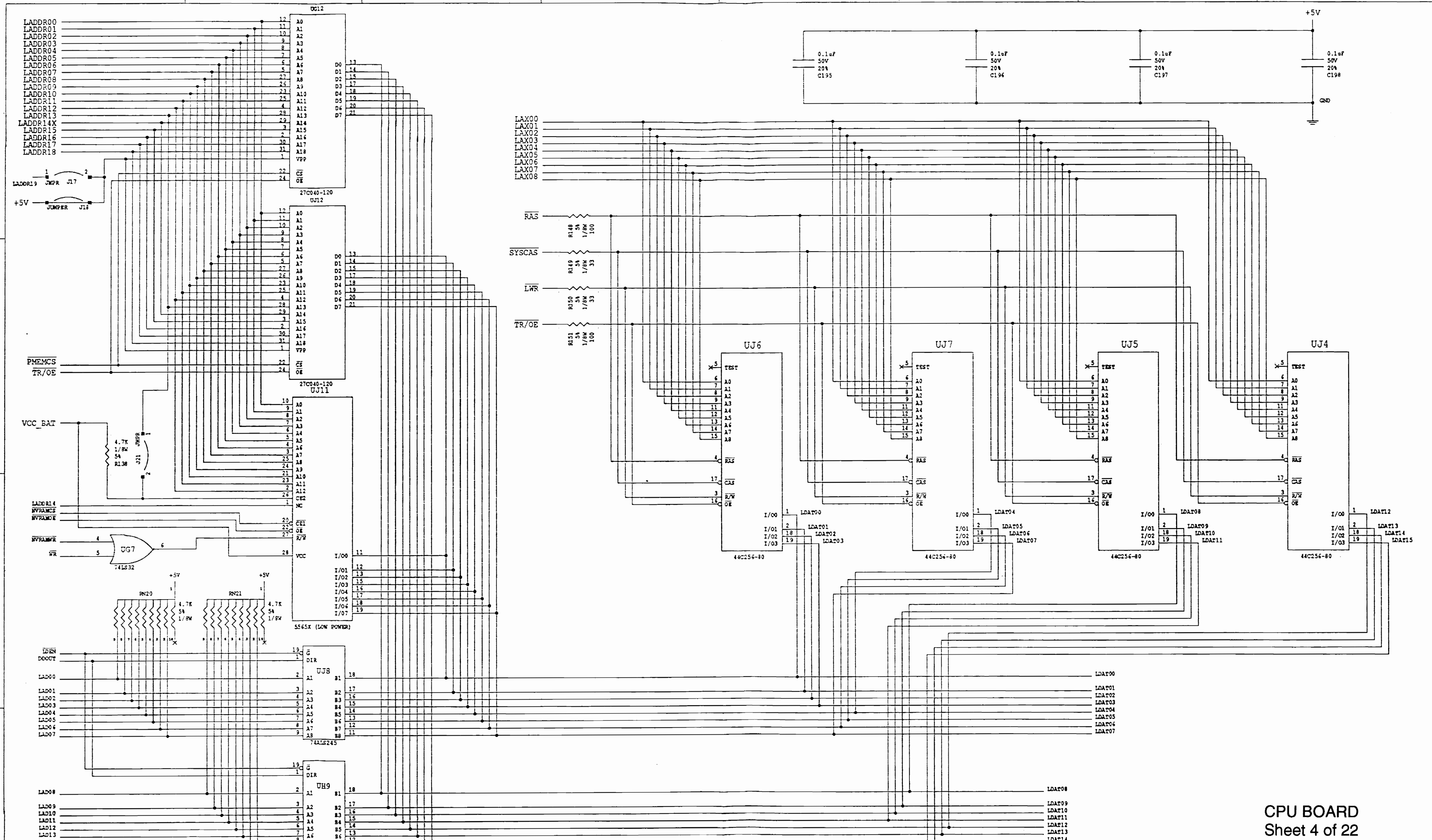
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DWN. BY REM DATE	FIRST USEAGE A-14816 DATE 09DEC92	TITLE CLOCK GENERATION/POWER MONITOR
CHECKED DATE	CURRENT PROJECT 40023 DATE 09DEC92	
APPROVED DATE	SHEET 02 OF 22	PART NO. 16-9423 REV. -



CPU BOARD
Sheet 3 of 22

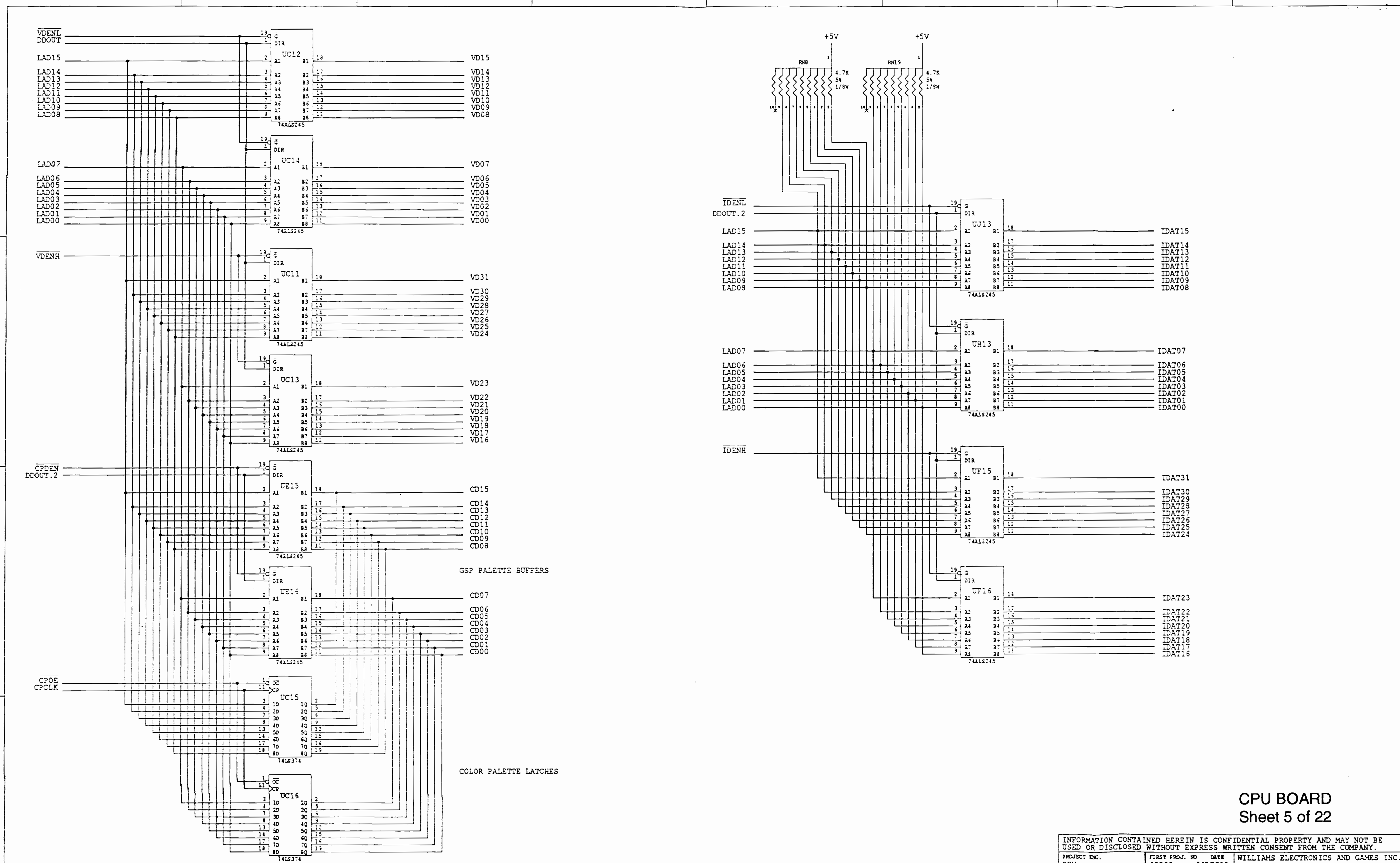
INFORMATION CONTAINED HEREIN IS CONFIDENTIAL PROPERTY AND MAY NOT BE USED OR DISCLOSED WITHOUT EXPRESS WRITTEN CONSENT FROM THE COMPANY.

PROJECT ENG. REM	FIRST PROJ. NO 40023 DATE 09DEC92	WILLIAMS ELECTRONICS AND GAMES INC. MIDWAY MANUFACTURING COMPANY 3401 N. CALIFORNIA AVE. CHICAGO IL.
DWN. BY REM DATE	FIRST USAGE A-14816 DATE 09DEC92	TITLE ADDRESS GENERATION/BUFFERS
CHECKED DATE	CURRENT PROJECT 40023 DATE 09DEC92	
APPROVED DATE	SHEET 03 OF 22	PART NO. 16-9423 REV. -



CPU BOARD
Sheet 4 of 22

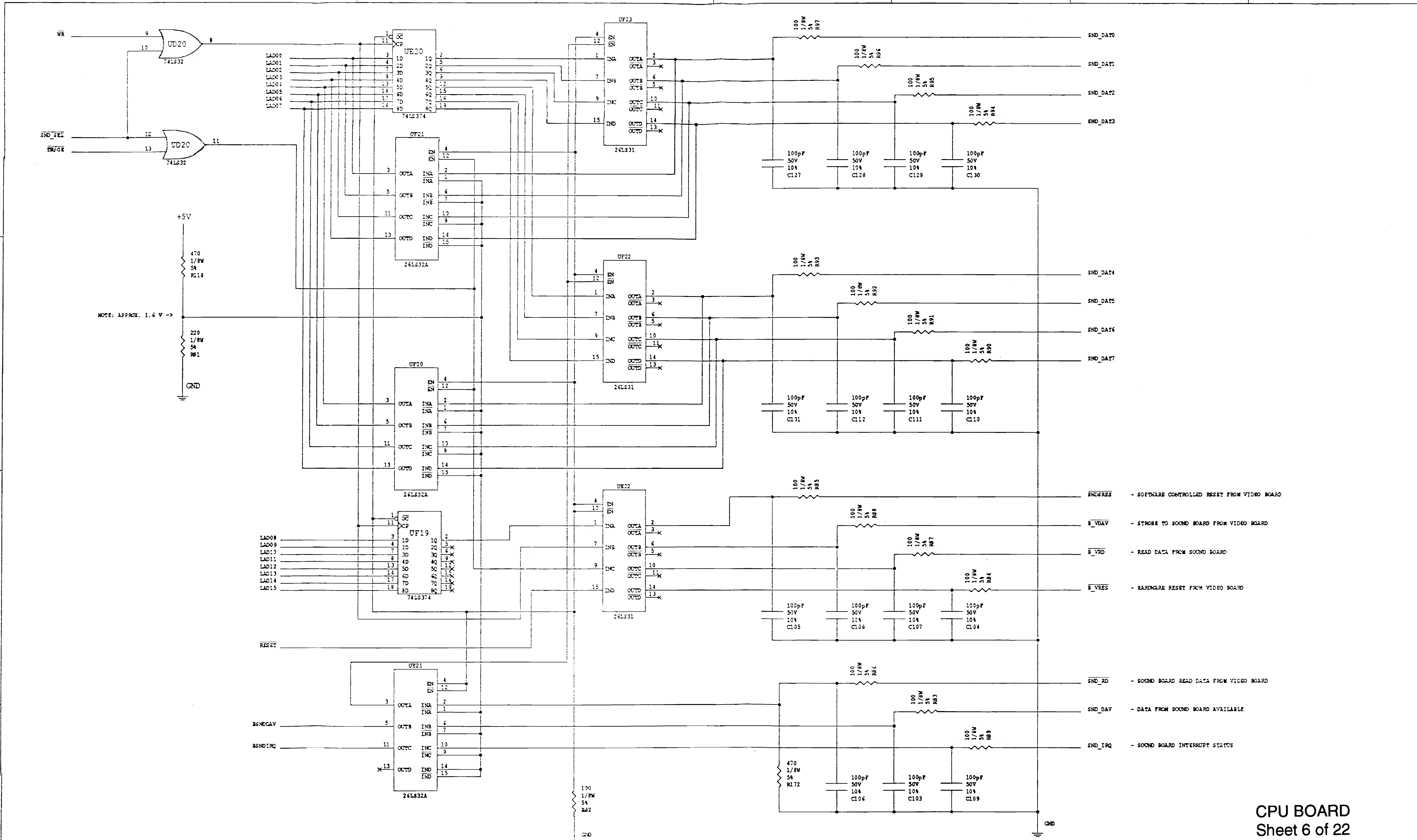
INFORMATION CONTAINED HEREIN IS CONFIDENTIAL PROPERTY AND MAY NOT BE USED OR DISCLOSED WITHOUT EXPRESS WRITTEN CONSENT FROM THE COMPANY.		
PROJECT ENG. REM	FIRST PROJ. NO 40023 DATE 09DEC92	WILLIAMS ELECTRONICS AND GAMES INC. MIDWAY MANUFACTURING COMPANY 3401 N. CALIFORNIA AVE. CHICAGO IL.
DWN. BY REM DATE	FIRST USEAGE A-14186 DATE 09DEC92	TITLE SYSTEM MEMORY
CHECKED DATE	CURRENT PROJECT 40023 DATE 09DEC92	
APPROVED DATE	SHEET 04 OF 22	PART NO. 16-9423 REV. -



CPU BOARD
Sheet 5 of 22

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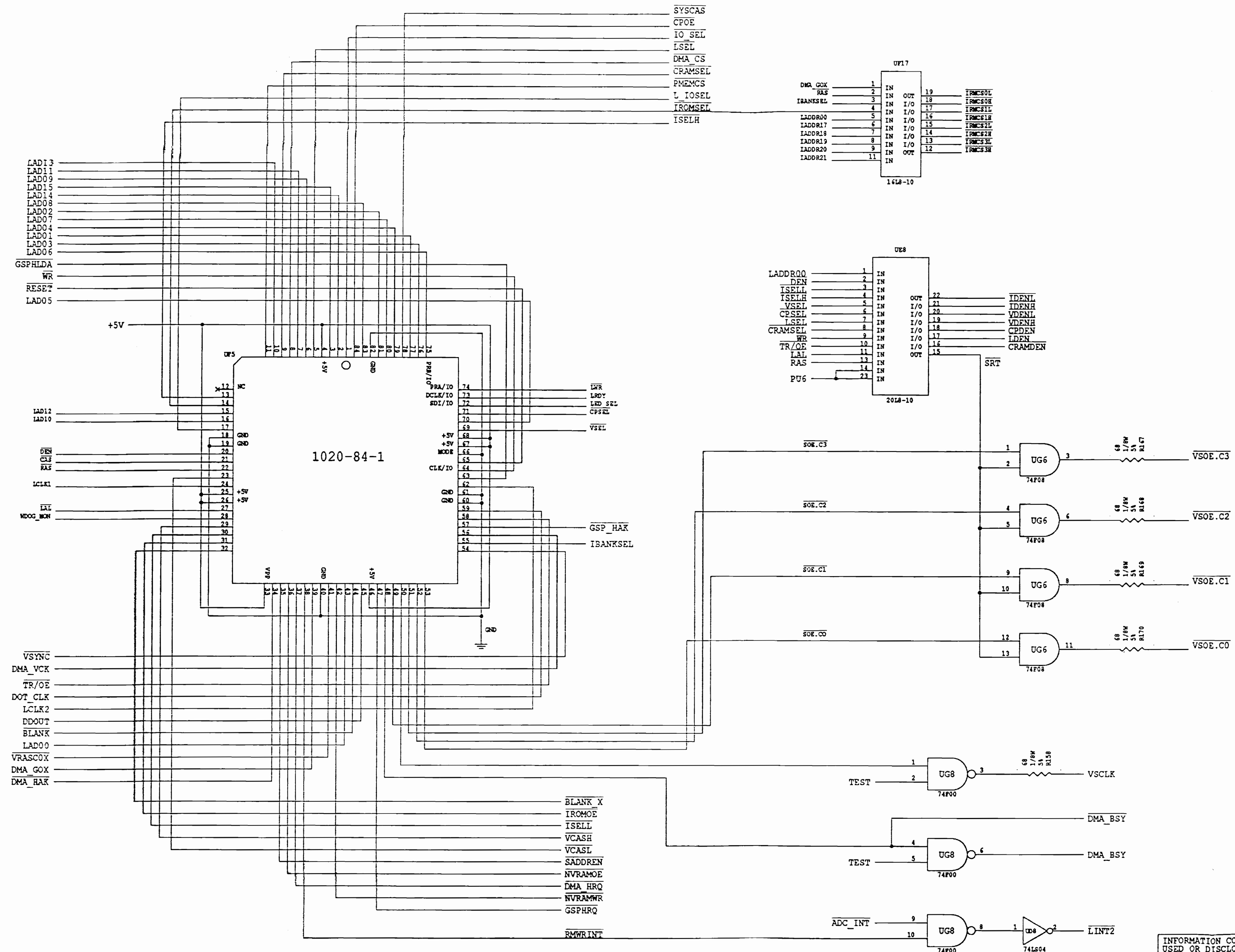
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DWN. BY REM DATE	FIRST USEAGE A-14816 DATE 09DEC92	
CHECKED DATE	CURRENT PROJECT 40023 DATE 09DEC92	TITLE IMAGE/VIDEO MEMORY DATA BUFFERS
APPROVED DATE	SHEET 05 OF 22	PART NO. 16-9423 REV. -



CPU BOARD
Sheet 6 of 22

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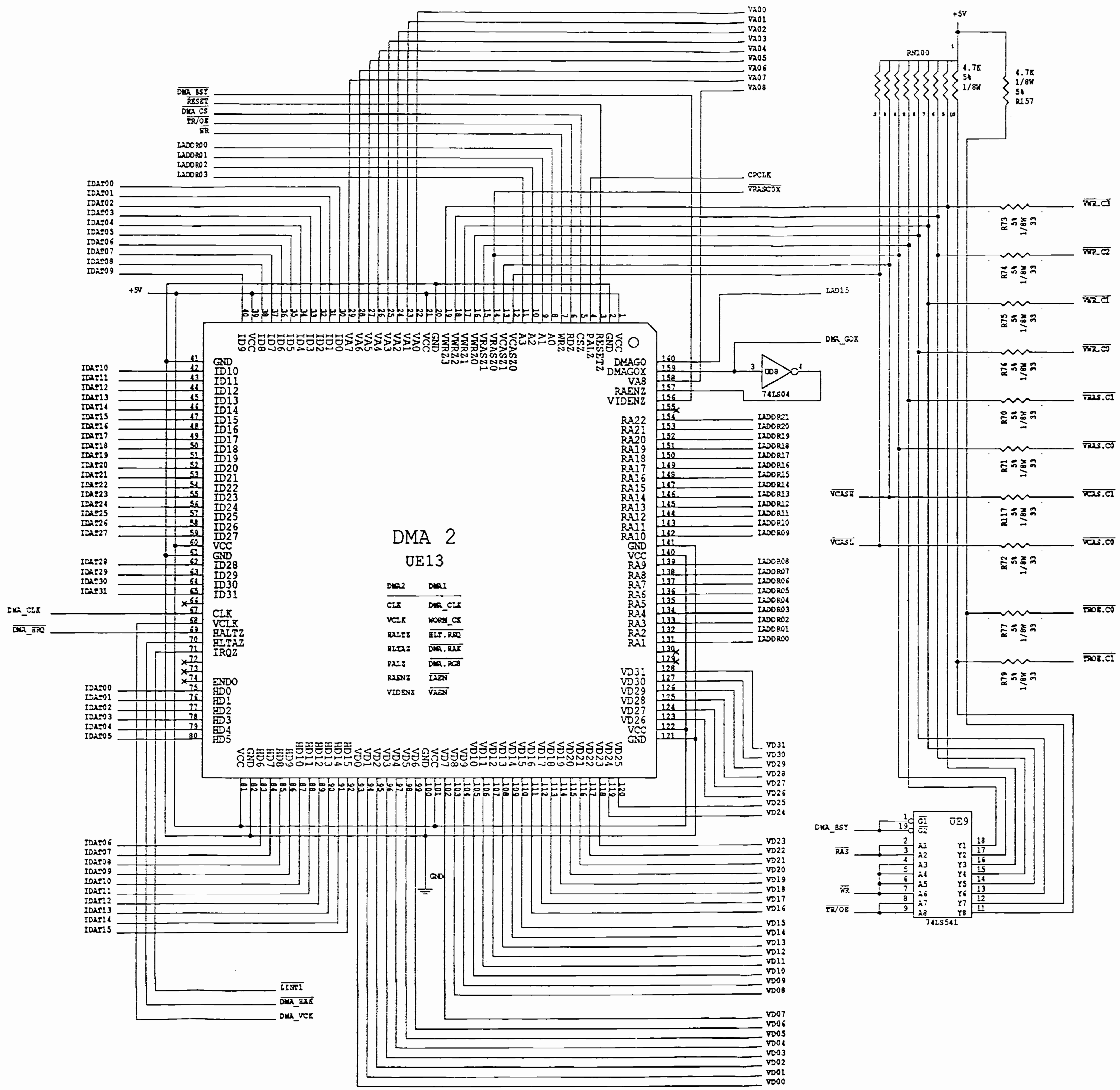
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DWN. BY REM DATE	FIRST USEAGE A-14816 DATE 09DEC92		
CHECKED DATE	CURRENT PROJECT 40023 DATE 09DEC92	TITLE SOUND INTERFACE	
APPROVED DATE	SHEET 06 OF 22	PART NO. 16-9423	REV. -



CPU BOARD
Sheet 7 of 22

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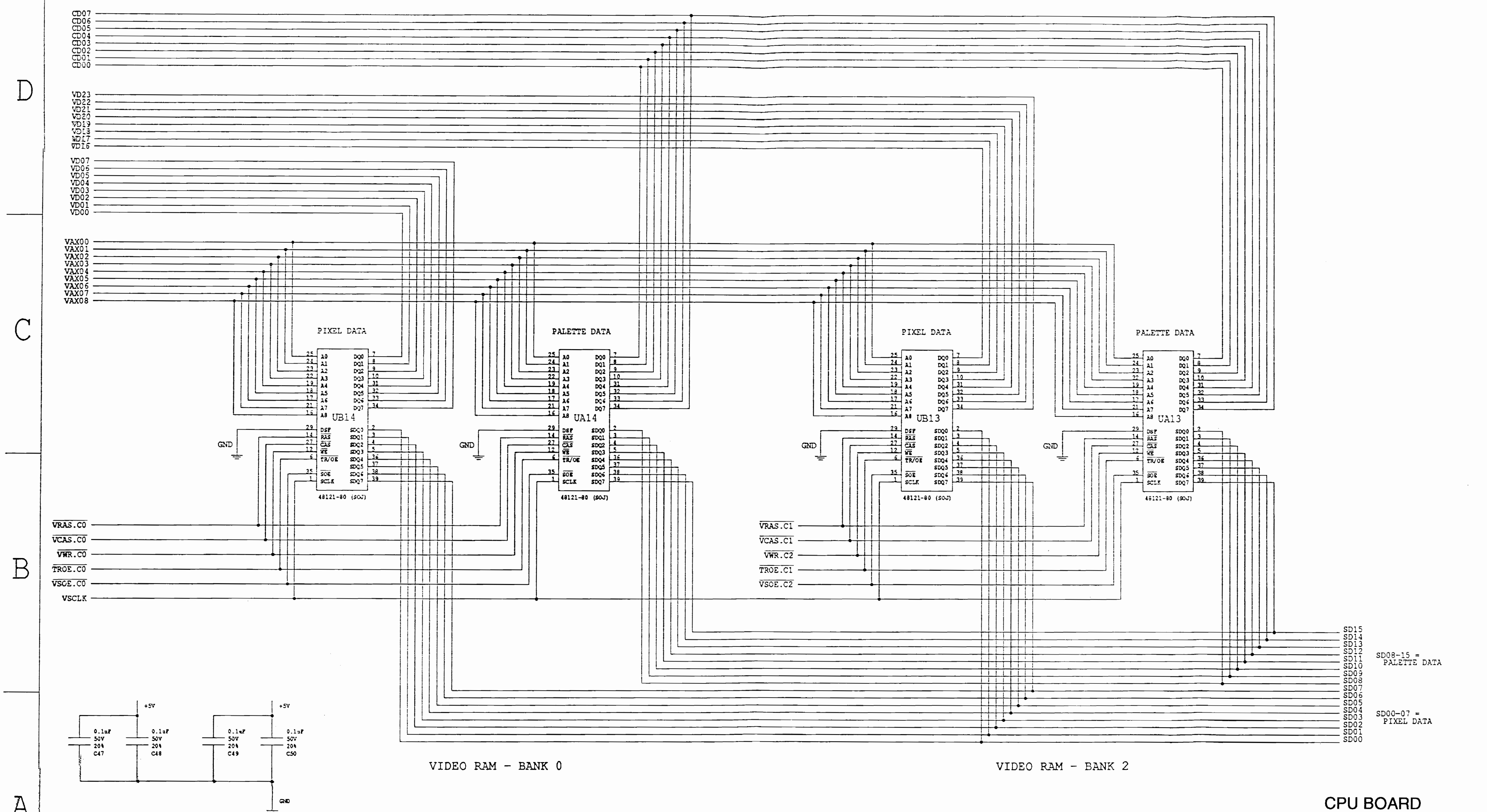
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DWN. BY REM DATE	FIRST USEAGE A-14816 DATE 09DEC92	TITLE FPGA
CHECKED DATE	CURRENT PROJECT 40023 DATE 09DEC92	
APPROVED DATE	SHEET 07 OF 22	PART NO. 16-9423 REV. -



CPU BOARD
Sheet 8 of 22

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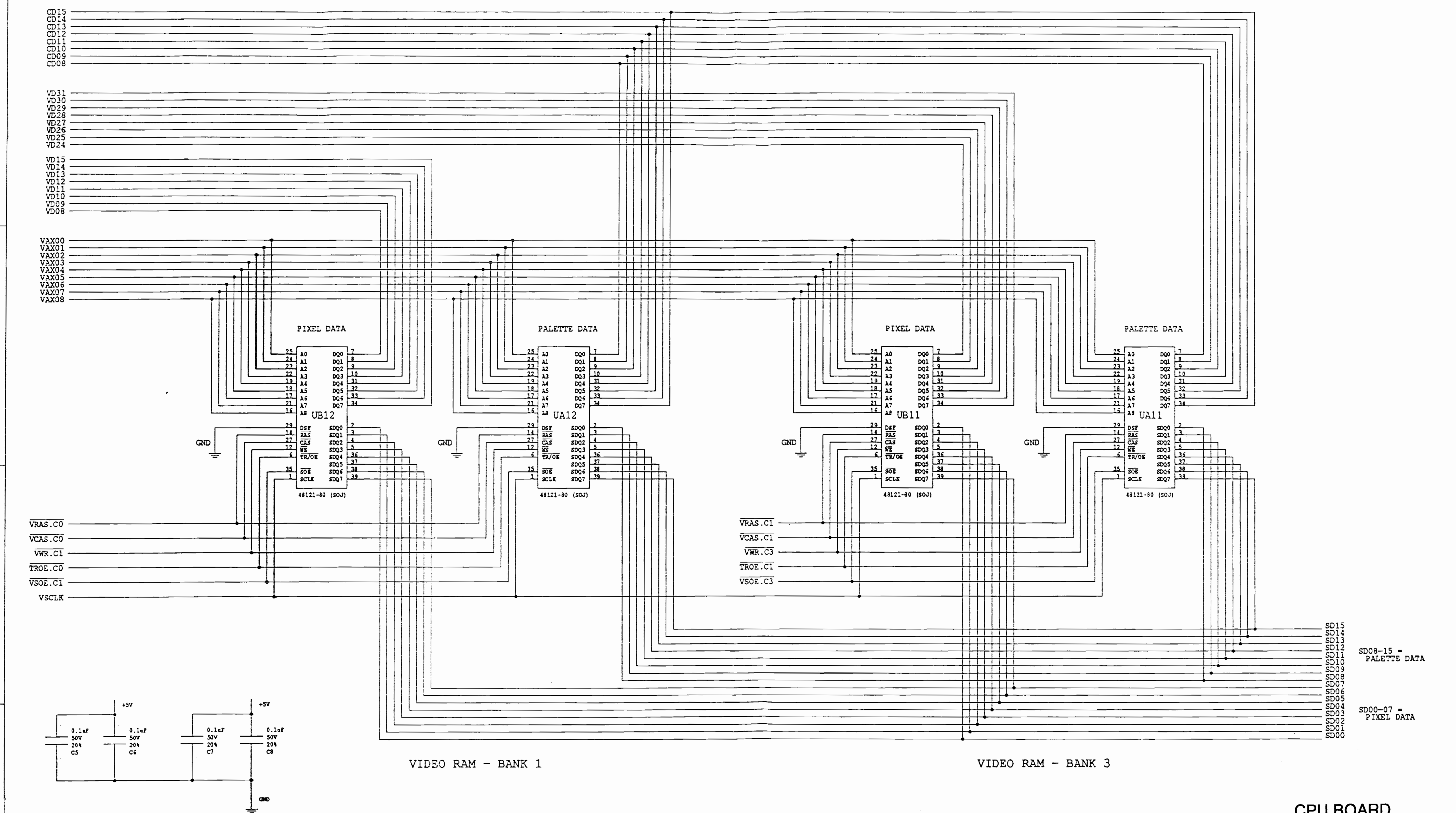
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DWN. BY REM DATE	FIRST USEAGE A-14816 DATE 09DEC92	TITLE DMA
CHECKED DATE	CURRENT PROJECT 40023 DATE 09DEC92	
APPROVED DATE	SHEET 08 OF 22	PART NO. 16-9423 REV. -



CPU BOARD
Sheet 9 of 22

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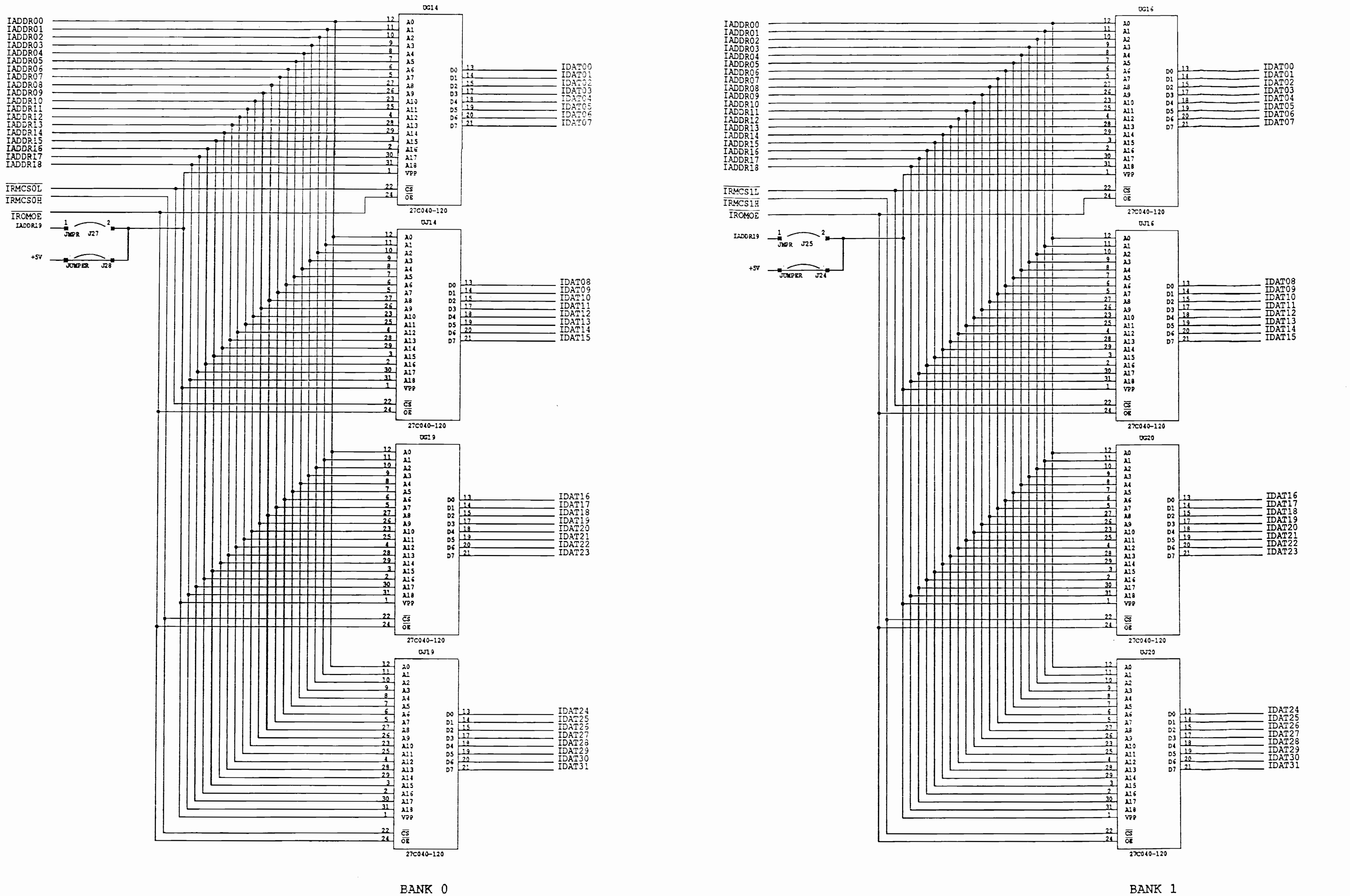
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DWN. BY REM DATE	FIRST CHANGE A-14816 DATE 09DEC92	TITLE VIDEO RAM BANK 0/BANK 2
CHECKED DATE	CURRENT PROJECT 40023 DATE 09DEC92	
APPROVED DATE	SHEET 09 OF 22	PART NO. 16-9423 REV. -



CPU BOARD
Sheet 10 of 22

INFORMATION CONTAINED HEREIN IS CONFIDENTIAL PROPERTY AND MAY NOT BE USED OR DISCLOSED WITHOUT EXPRESS WRITTEN CONSENT FROM THE COMPANY.

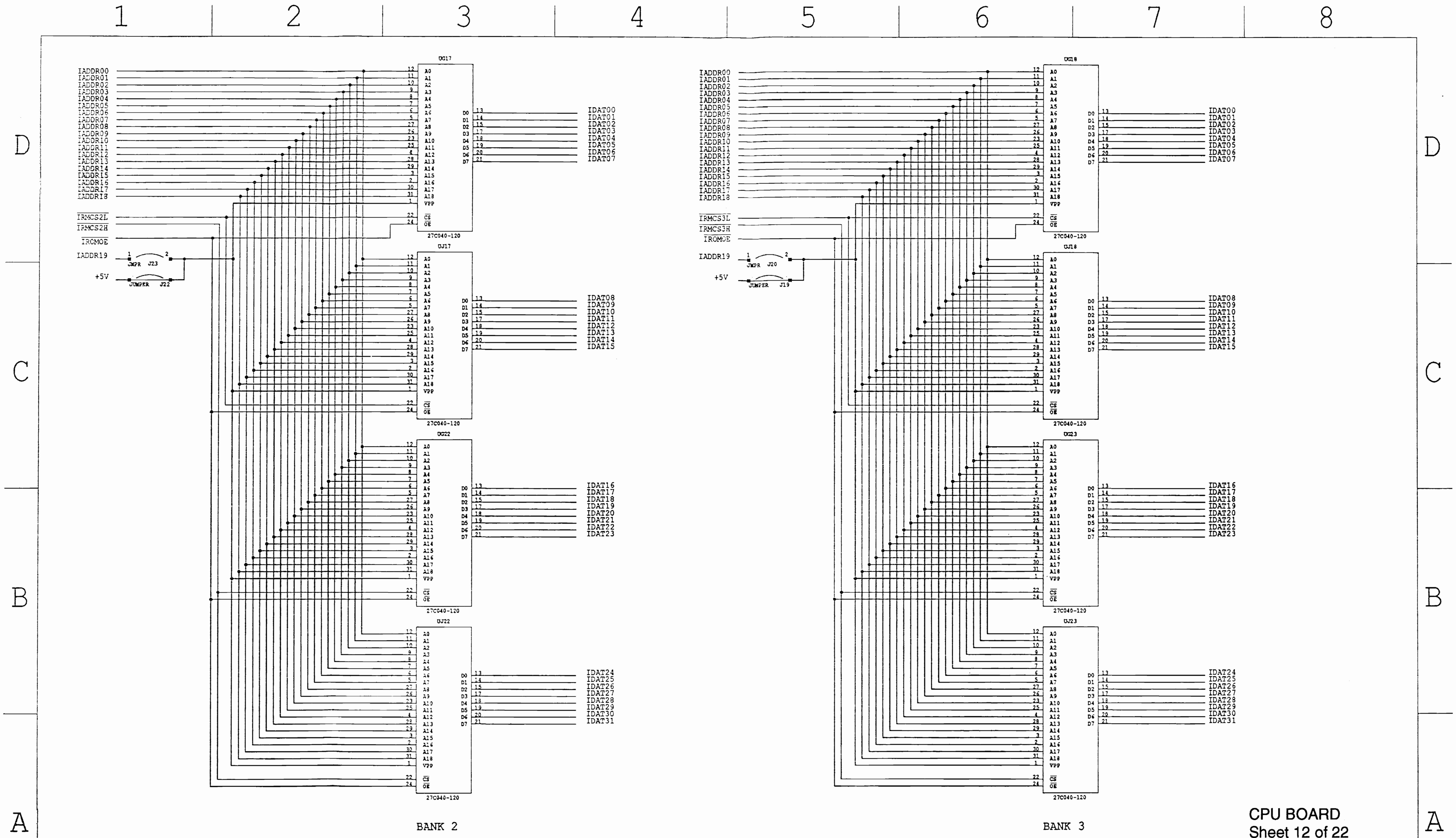
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DWN. BY REM DATE	FIRST USEAGE A-14816 DATE 09DEC92	TITLE VIDEO RAM BANK 1/BANK 3
CHECKED DATE	CURRENT PROJECT 40023 DATE 09DEC92	
APPROVED DATE	SHEET 10 OF 22	PART NO. 16-9423 REV. -



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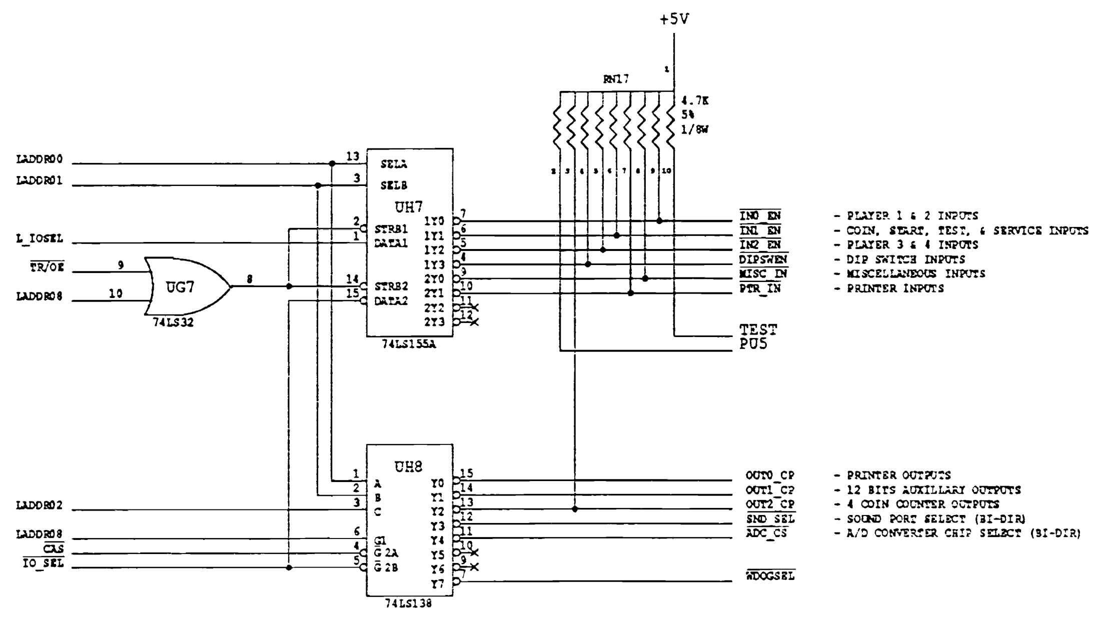
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PROJECT ENG. REM		FIRST PROJ. NO 40023 DATE 09DEC92	WILLIAMS ELECTRONICS AND GAMES INC. MIDWAY MANUFACTURING COMPANY 3401 N. CALIFORNIA AVE. CHICAGO IL.
DWN. BY REM	DATE	FIRST USEAGE A-14816 DATE 09DEC92	TITLE IMAGE ROM BANK 0/BANK 1
CHECKED	DATE	CURRENT PROJECT 40023 DATE 09DEC92	
APPROVED	DATE	SHEET 11 OF 22	PART NO. 16-9423 REV. -



CPU BOARD
Sheet 12 of 22

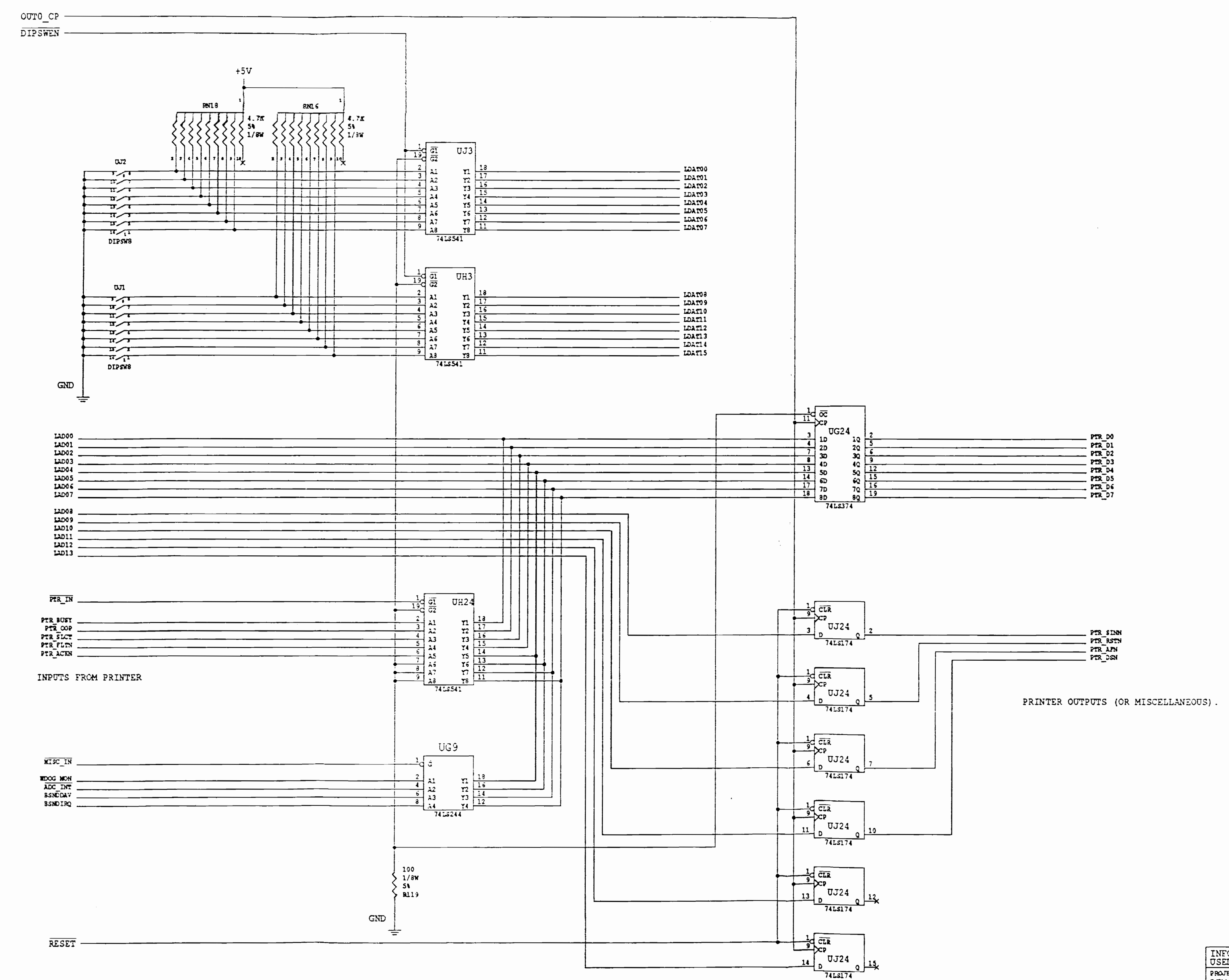
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PROJECT ENG. REM	FIRST PROJ. NO 40023 DATE 09DEC92	WILLIAMS ELECTRONICS AND GAMES INC. MIDWAY MANUFACTURING COMPANY 3401 N. CALIFORNIA AVE. CHICAGO IL.
DWN. BY REM DATE	FIRST USEAGE A-14816 DATE 09DEC92	TITLE IMAGE ROM BANK 2/BANK 3
CHECKED DATE	CURRENT PROJECT 40023 DATE 09DEC92	
APPROVED DATE	SHEET 12 OF 22	PART NO. 16-9423 REV. -



CPU BOARD
Sheet 13 of 22

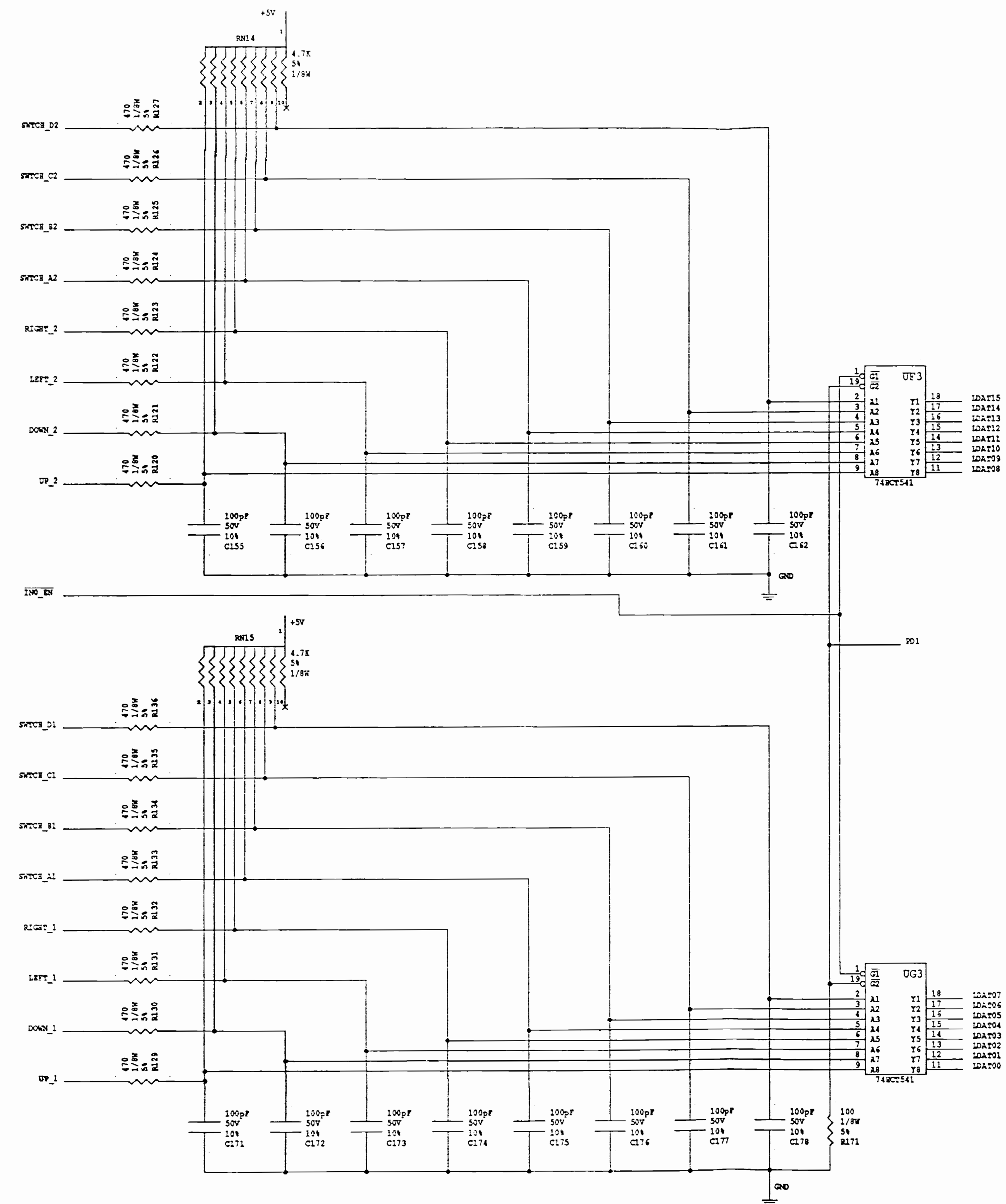
INFORMATION CONTAINED HEREIN IS CONFIDENTIAL PROPERTY AND MAY NOT BE USED OR DISCLOSED WITHOUT EXPRESS WRITTEN CONSENT FROM THE COMPANY.

PROJECT ENG. REM	FIRST PROJ. NO 40023 DATE 09DEC92	WILLIAMS ELECTRONICS AND GAMES INC. MIDWAY MANUFACTURING COMPANY 3401 N. CALIFORNIA AVE. CHICAGO IL.
DWN. BY REM DATE	FIRST USEAGE A-14816 DATE 09DEC92	TITLE I/O DECODING
CHECKED DATE	CURRENT PROJECT 40023 DATE 09DEC92	
APPROVED DATE	SHEET 13 OF 22	PART NO. 16-9423 REV. -



CPU BOARD
Sheet 14 of 22

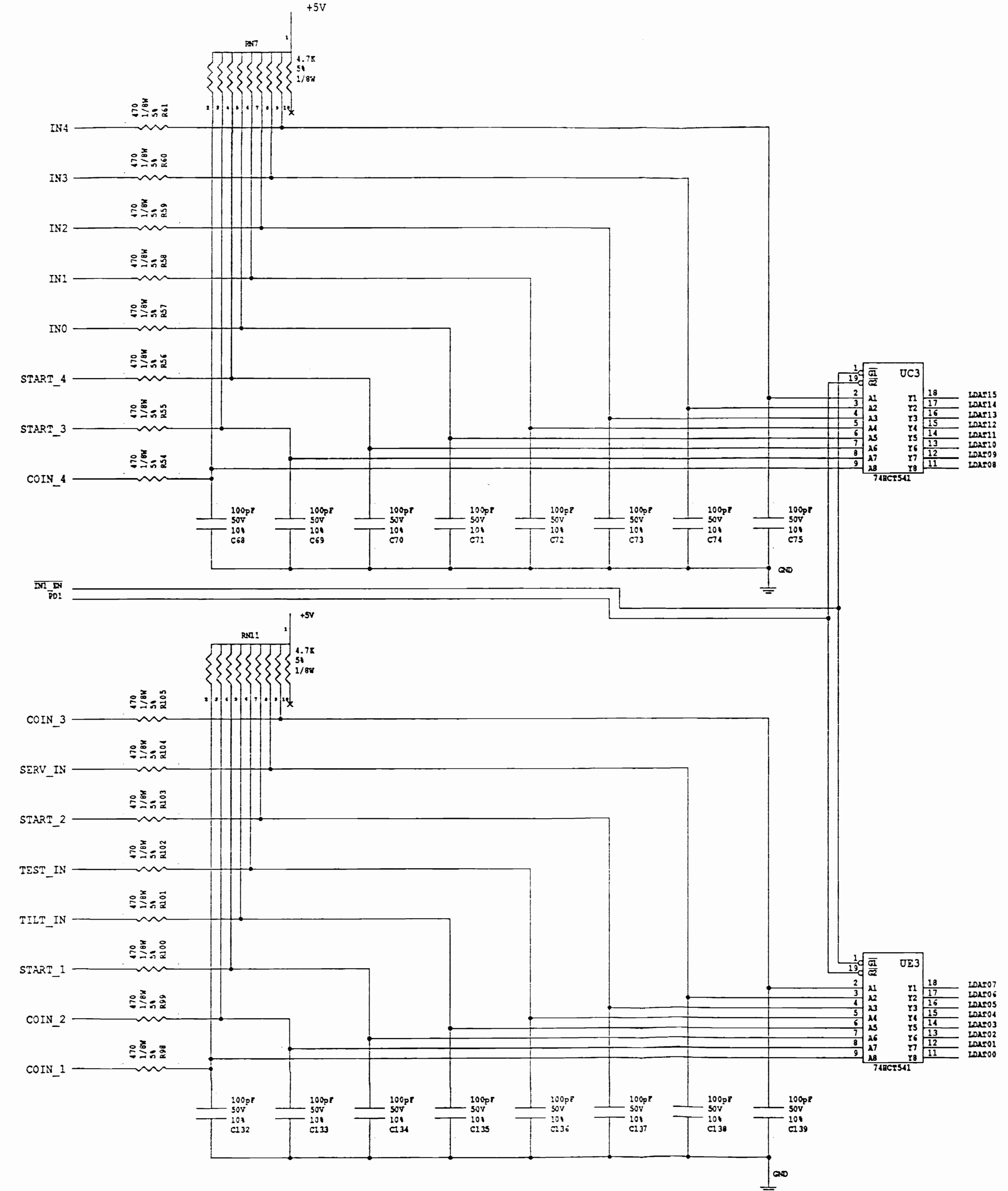
INFORMATION CONTAINED HEREIN IS CONFIDENTIAL PROPERTY AND MAY NOT BE USED OR DISCLOSED WITHOUT EXPRESS WRITTEN CONSENT FROM THE COMPANY.			
PROJECT ENG. REM	FIRST PROJ. NO 40023 DATE 09DEC92	WILLIAMS ELECTRONICS AND GAMES INC. MIDWAY MANUFACTURING COMPANY 3401 N. CALIFORNIA AVE. CHICAGO IL.	
DWN. BY REM DATE	FIRST USEAGE A-14816 DATE 09DEC92	TITLE	
CHECKED DATE	CURRENT PROJECT 40023 DATE 09DEC92	MISC. I/O AND DIP SWITCH	
APPROVED DATE	SHEET 14 OF 22	PART NO. 16-9423	REV. -



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Sheet 15 of 22

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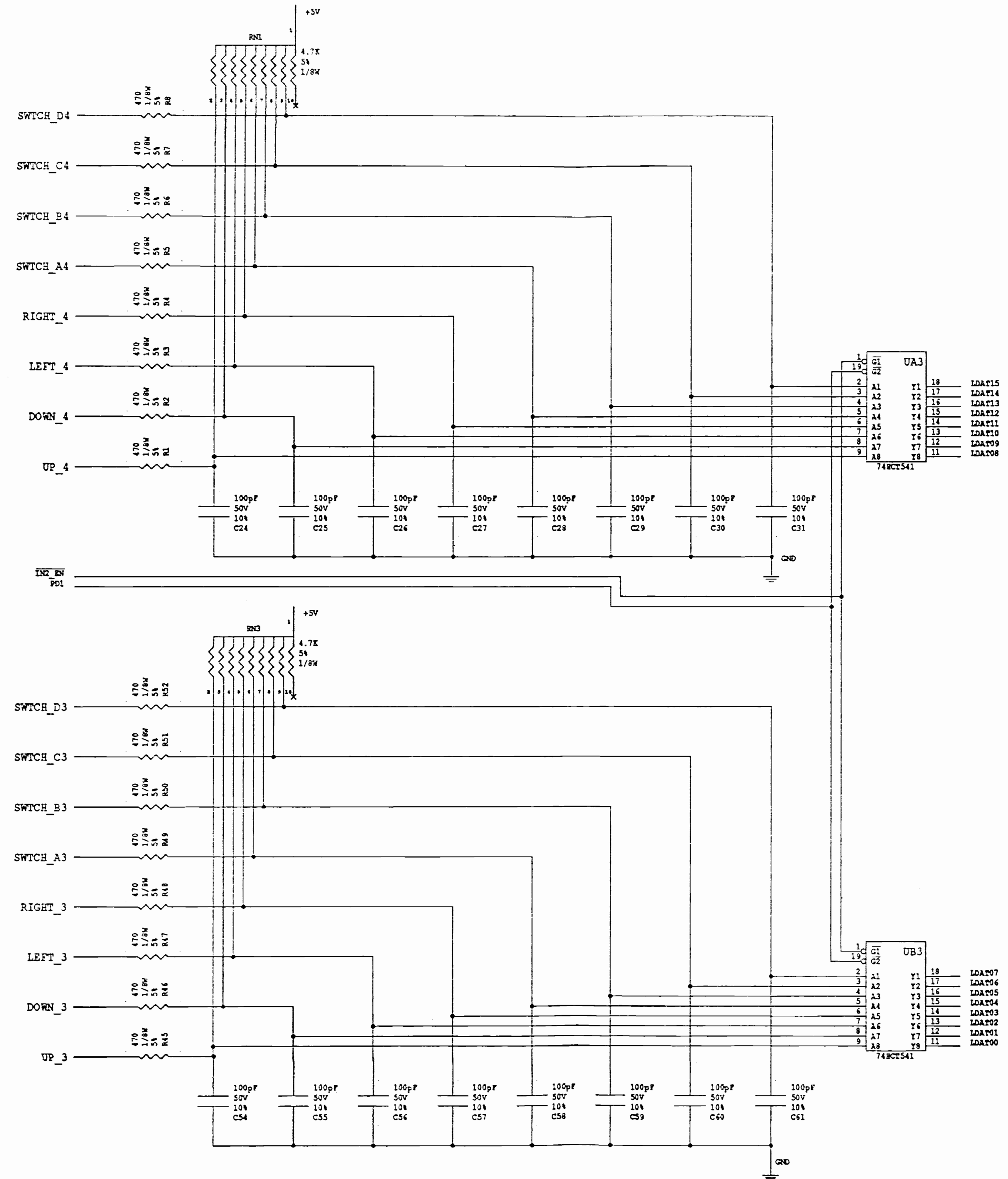
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DWN. BY REM DATE	FIRST USEAGE A-14816 DATE 09DEC92	TITLE PLAYER 1/PLAYER 2 INPUTS
CHECKED DATE	CURRENT PROJECT 40023 DATE 09DEC92	
APPROVED DATE	SHEET 15 OF 22	PART NO. 16-9423 REV. -



CPU BOARD
Sheet 16 of 22

INFORMATION CONTAINED HEREIN IS CONFIDENTIAL PROPERTY AND MAY NOT BE USED OR DISCLOSED WITHOUT EXPRESS WRITTEN CONSENT FROM THE COMPANY.

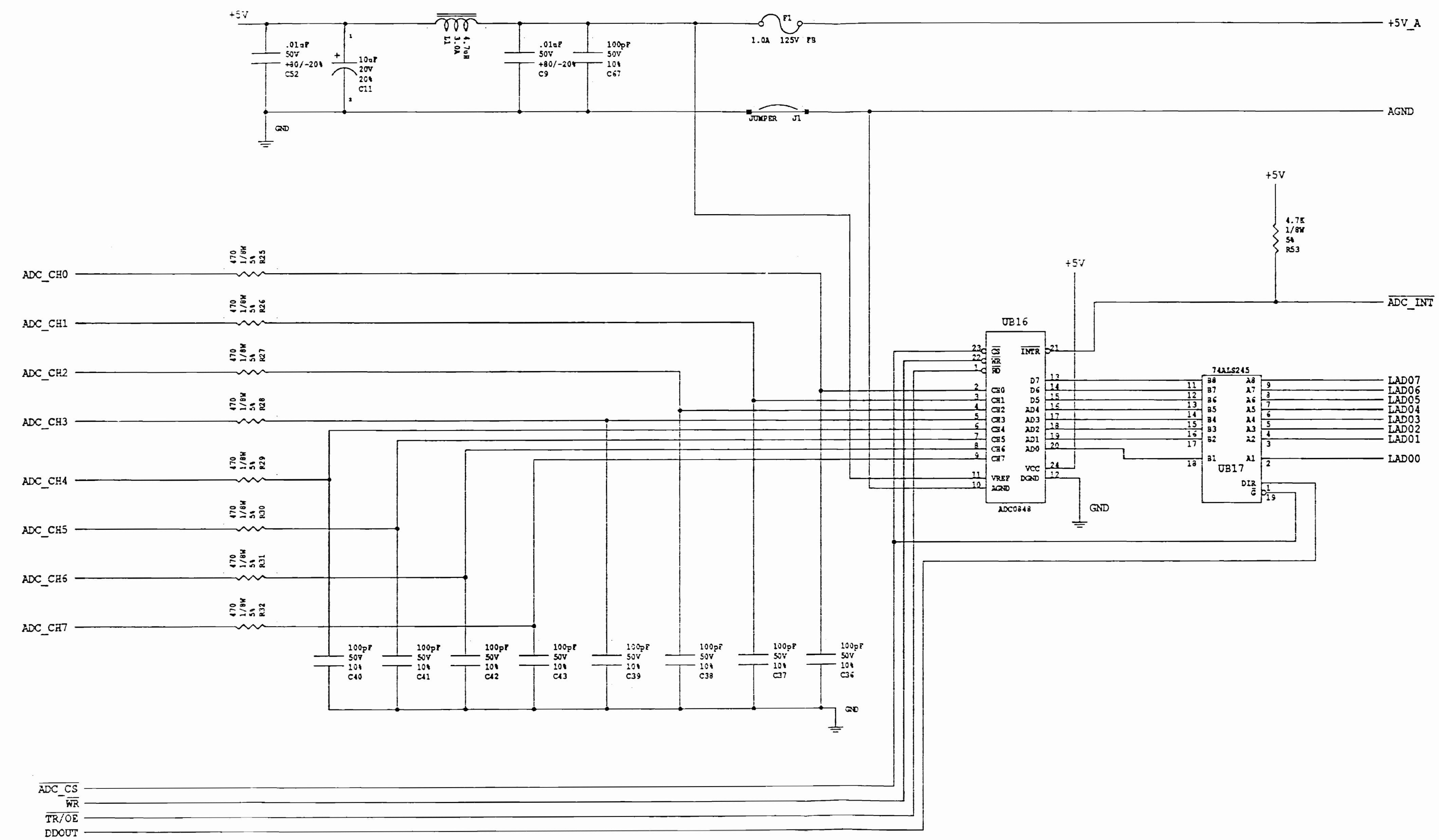
PROJECT ENG. REM	FIRST PROJ. NO 40023 DATE 09DEC92	WILLIAMS ELECTRONICS AND GAMES INC. MIDWAY MANUFACTURING COMPANY 3401 N. CALIFORNIA AVE. CHICAGO IL.
DWN. BY REM DATE	FIRST USAGE A-14816 DATE 09DEC92	TITLE
CHECKED DATE	CURRENT PROJECT 40023 DATE 09DEC92	EXTRA INPUTS/COIN/START
APPROVED DATE	SHEET 16 OF 22	PART NO. 16-9423 REV. -



CPU BOARD
Sheet 17 of 22

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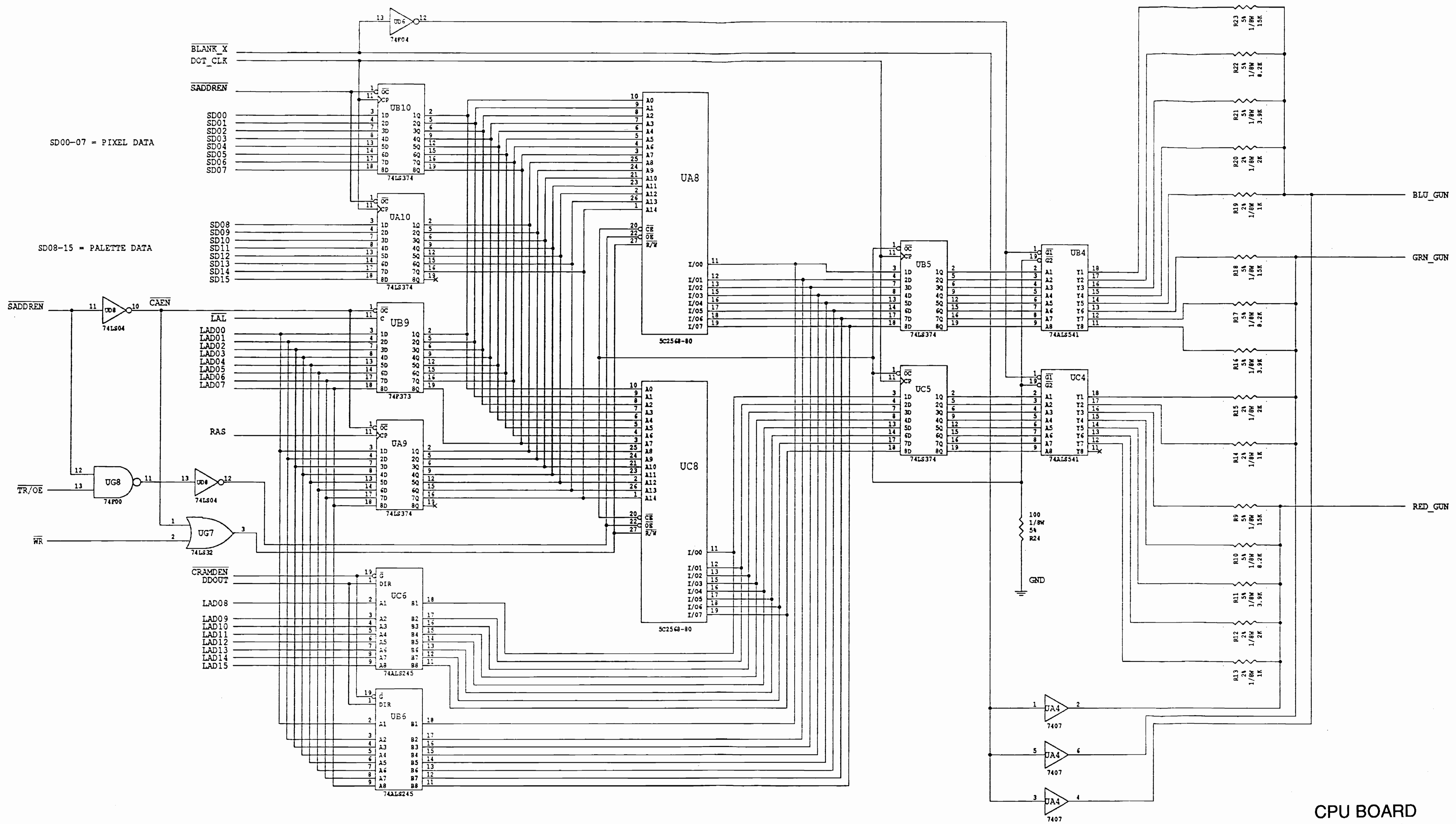
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DWN. BY REM DATE	FIRST USEAGE A-14816 DATE 09DEC92	TITLE PLAYER 3/PLAYER 4 INPUTS
CHECKED DATE	CURRENT PROJECT 40023 DATE 09DEC92	
APPROVED DATE	SHEET 17 OF 22	PART NO. 16-9423 REV. -



CPU BOARD
Sheet 18 of 22

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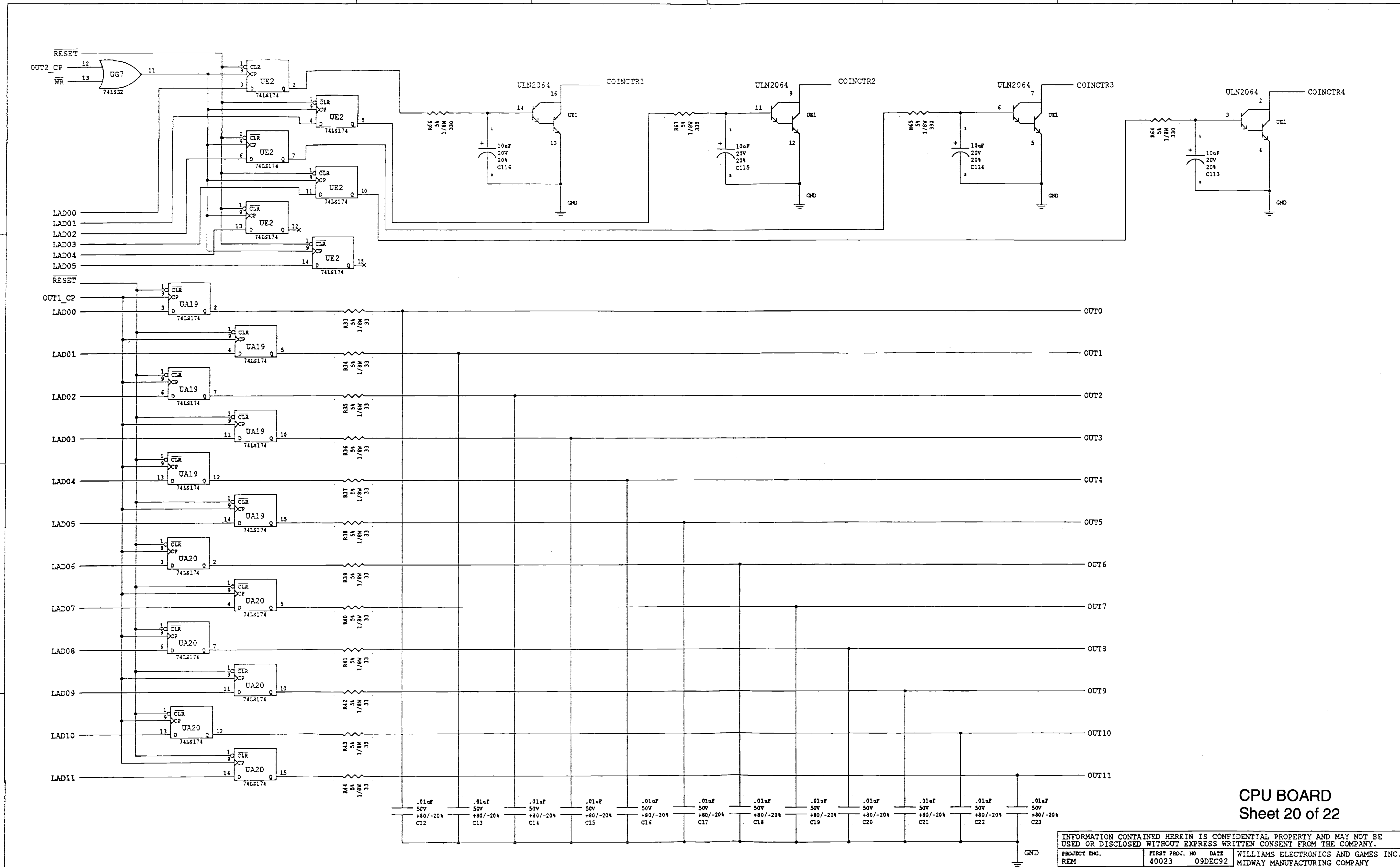
PROJECT ENG. REM	FIRST PROJ. NO 40023 DATE 09DEC92	WILLIAMS ELECTRONICS AND GAMES INC. MIDWAY MANUFACTURING COMPANY 3401 N. CALIFORNIA AVE. CHICAGO IL.
DWN. BY REM DATE	FIRST USAGE A-14816 DATE 09DEC92	TITLE A/D
CHECKED DATE	CURRENT PROJECT 40023 DATE 09DEC92	
APPROVED DATE	SHEET 18 OF 22	PART NO. 16-9423 REV. -



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Sheet 19 of 22

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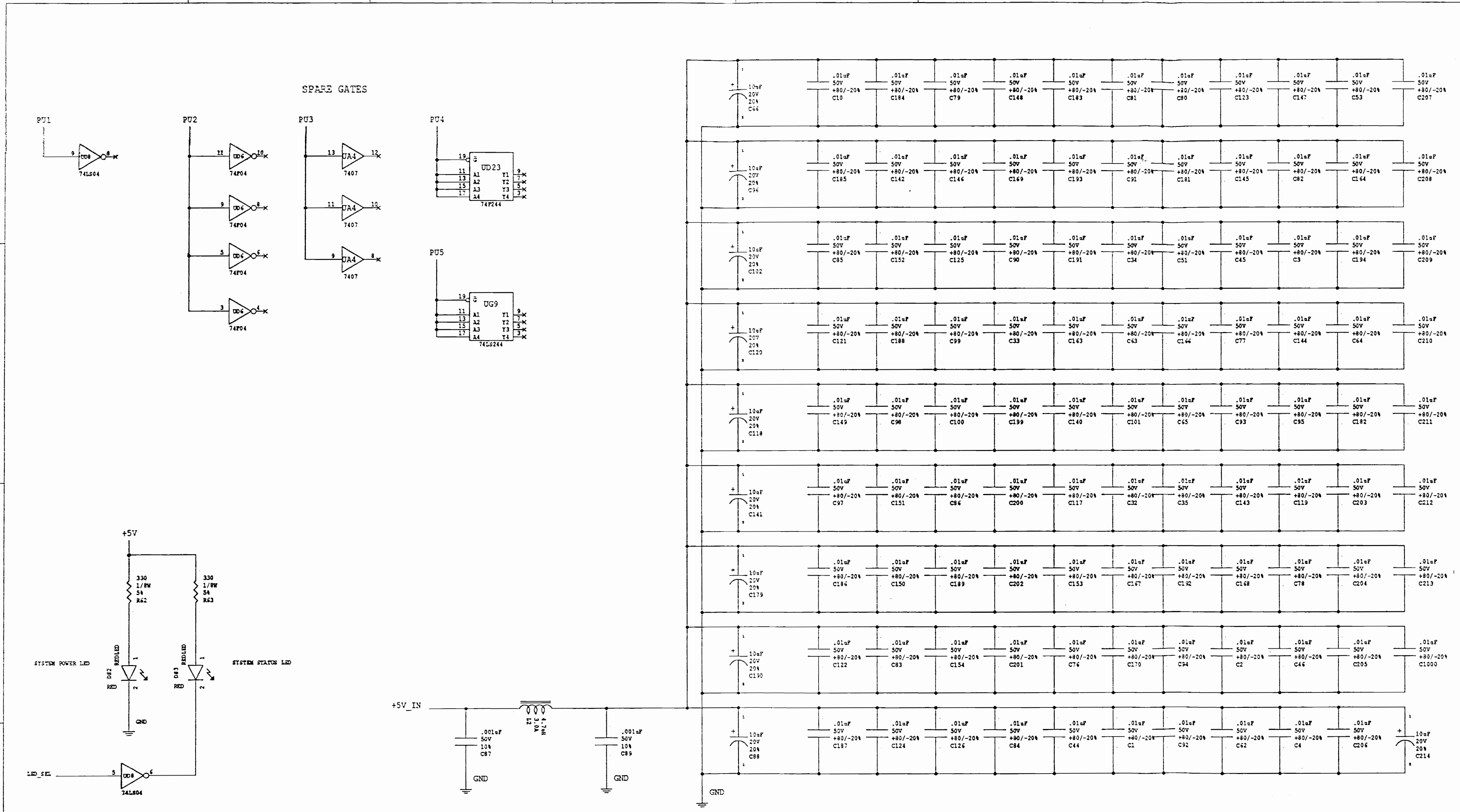
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DWN. BY RZM DATE	FIRST USEAGE A-14816 DATE 09DEC92	TITLE RAMDAC
CHECKED DATE	CURRENT PROJECT 40023 DATE 09DEC92	
APPROVED DATE	SHEET 19 OF	PART NO. 16-9423 REV. _



CPU BOARD
Sheet 20 of 22

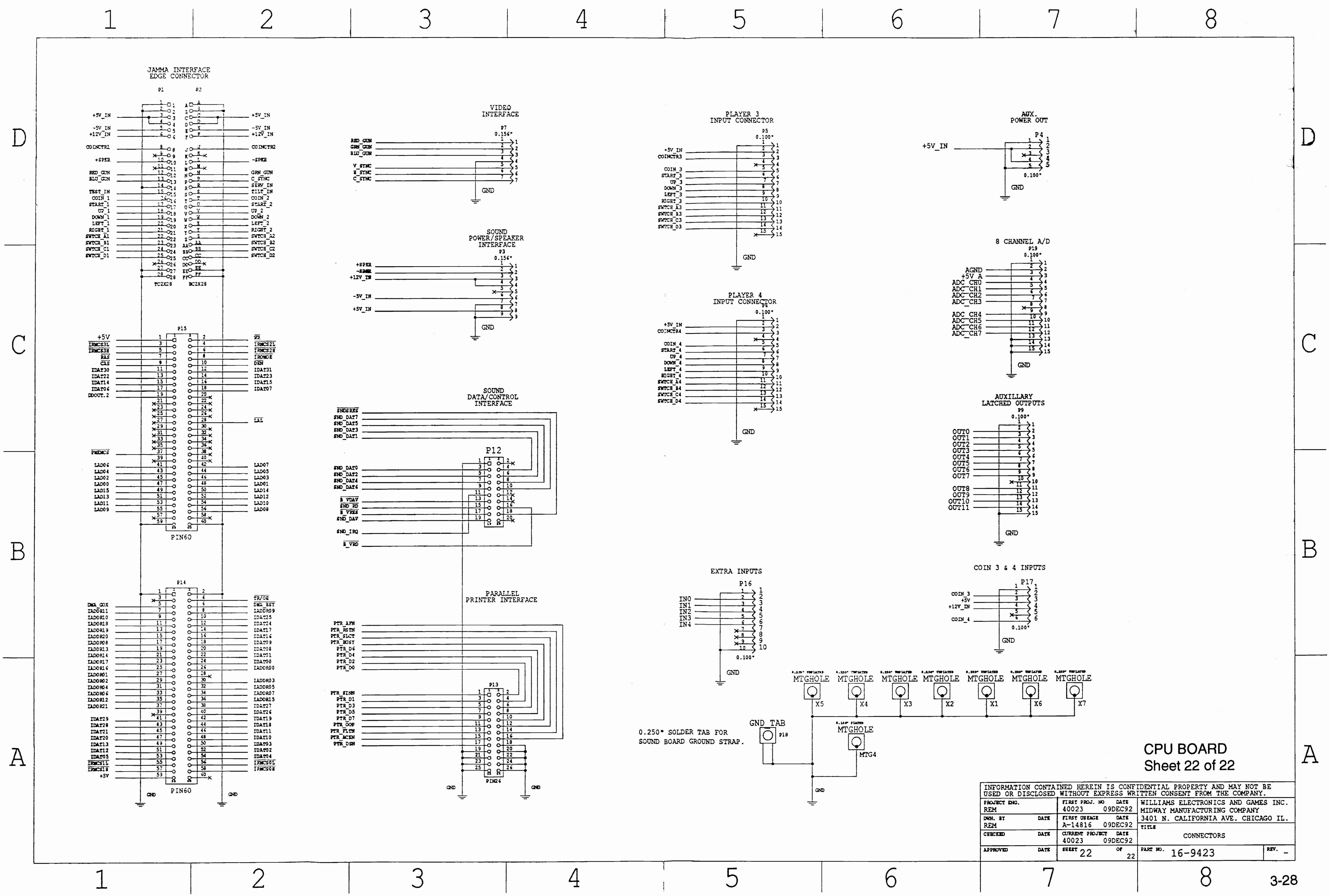
INFORMATION CONTAINED HEREIN IS CONFIDENTIAL PROPERTY AND MAY NOT BE USED OR DISCLOSED WITHOUT EXPRESS WRITTEN CONSENT FROM THE COMPANY.

PROJECT ENG. REM	FIRST PROJ. NO 40023 DATE 09DEC92	WILLIAMS ELECTRONICS AND GAMES INC. MIDWAY MANUFACTURING COMPANY 3401 N. CALIFORNIA AVE. CHICAGO IL.
DWN. BY REM DATE	FIRST USEAGE A-14816 DATE 09DEC92	TITLE OUTPUTS
CHECKED DATE	CURRENT PROJECT 40023 DATE 09DEC92	
APPROVED DATE	SHEET 20 OF 22	PART NO. 16-9423 REV. -

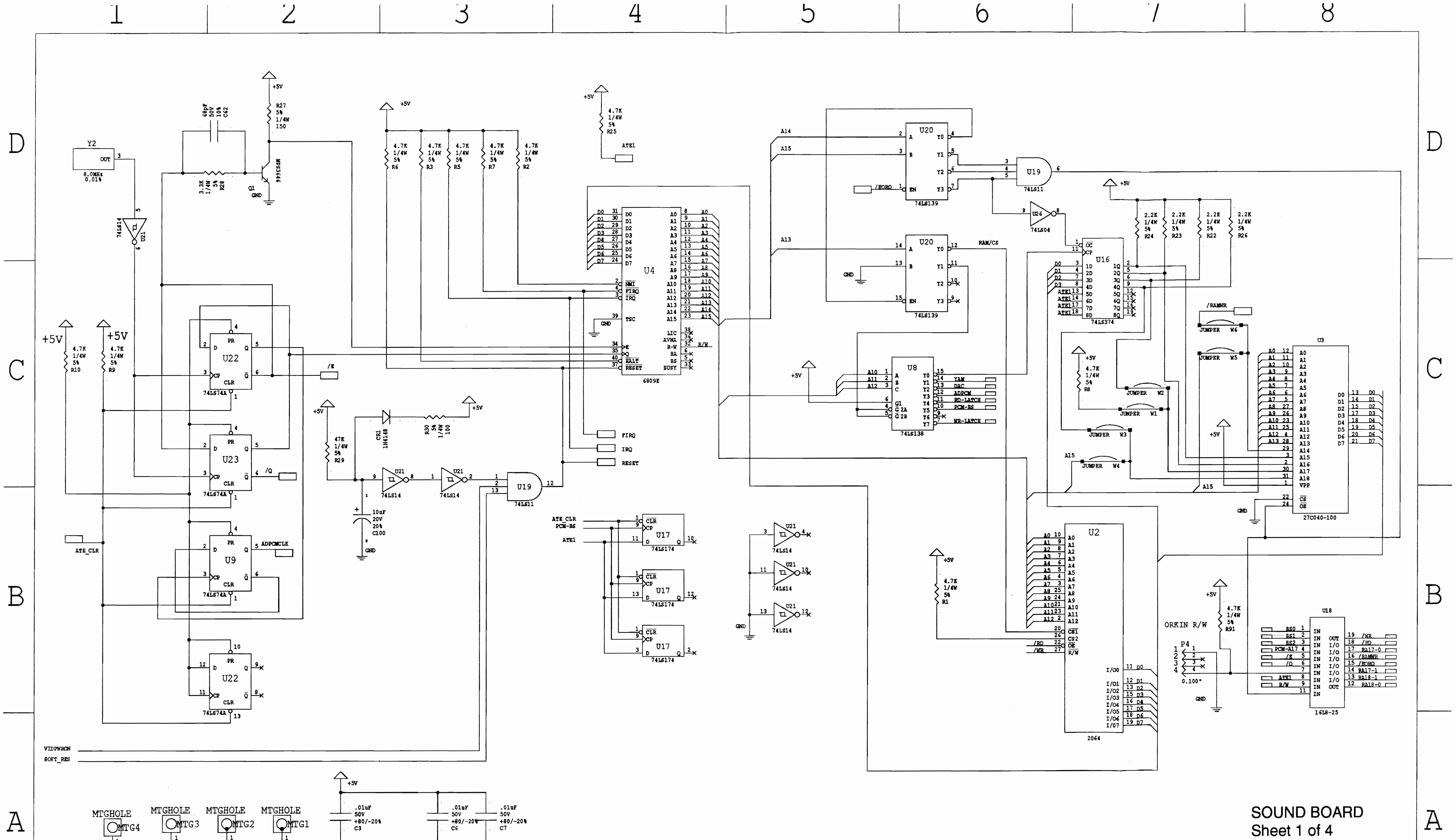


CPU BOARD
Sheet 21 of 22

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PROJECT ENG. REM	FIRST PROJ. NO 40023 DATE 09DEC92	WILLIAMS ELECTRONICS AND GAMES INC. MIDWAY MANUFACTURING COMPANY 3401 N. CALIFORNIA AVE. CHICAGO IL.	
DWN. BY REM DATE	FIRST USAGE A-14816 DATE 09DEC92		
CHECKED DATE	CURRENT PROJECT 40023 DATE 09DEC92	TITLE POWER	
APPROVED DATE	SHEET 21 OF 22	PART NO. 16-9423	REV. -



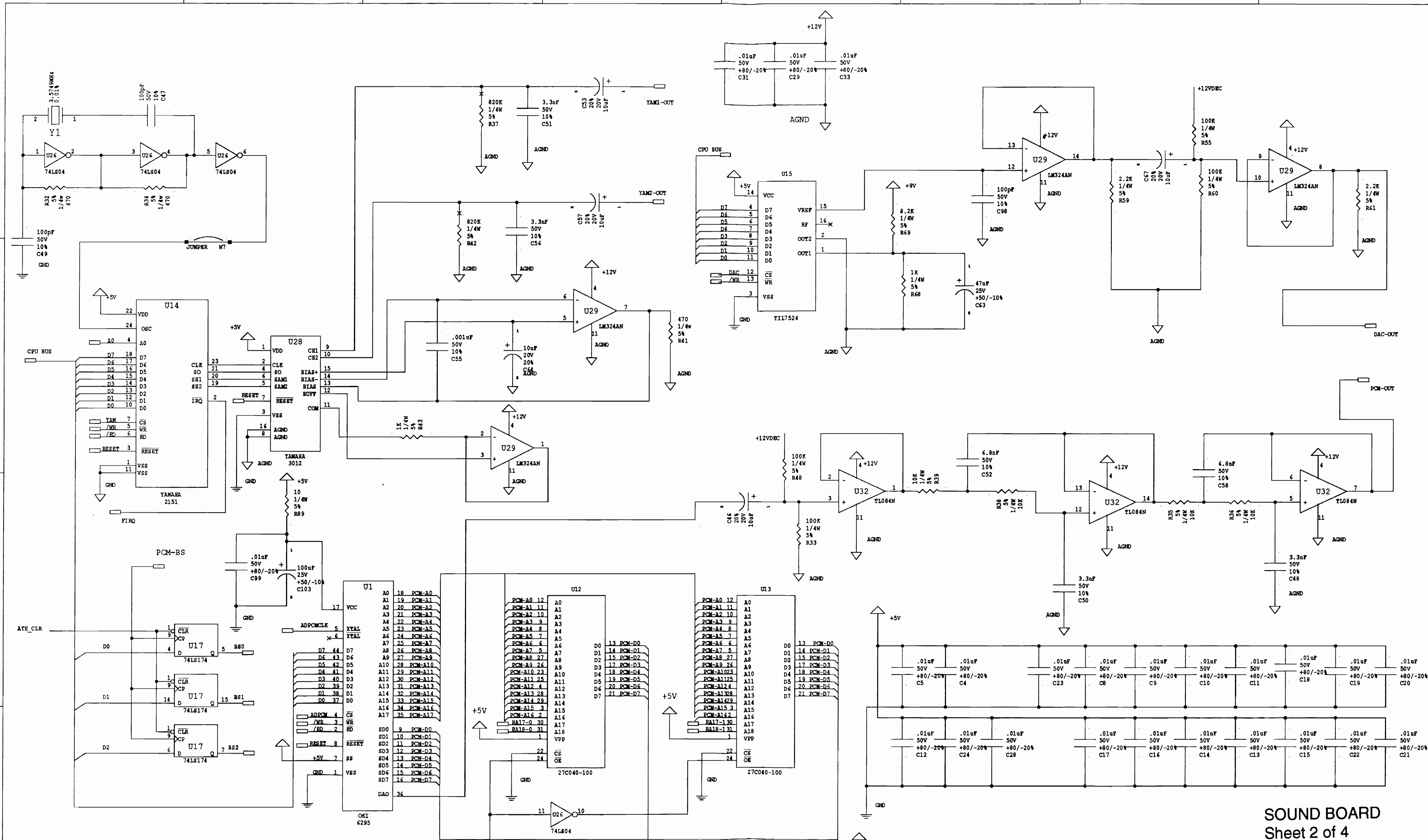
JAMMA INTERFACE EDGE CONNECTOR
P1
P2
P15
PIN60
P14
PIN60
VIDEO INTERFACE
P7
0.156"
GND
SOUND POWER/SPEAKER INTERFACE
P3
0.156"
GND
SOUND DATA/CONTROL INTERFACE
P12
PARALLEL PRINTER INTERFACE
P13
PIN26
GND
PLAYER 3 INPUT CONNECTOR
P5
0.100"
GND
PLAYER 4 INPUT CONNECTOR
P6
0.100"
GND
EXTRA INPUTS
P16
IN0
IN1
IN2
IN3
IN4
0.100"
GND
AUX. POWER OUT
P4
+5V_IN
0.100"
GND
8 CHANNEL A/D
P19
0.100"
AGND
+5V_A
ADC_CH0
ADC_CH1
ADC_CH2
ADC_CH3
ADC_CH4
ADC_CH5
ADC_CH6
ADC_CH7
GND
AUXILLARY LATCHED OUTPUTS
P9
0.100"
OUT0
OUT1
OUT2
OUT3
OUT4
OUT5
OUT6
OUT7
OUT8
OUT9
OUT10
OUT11
GND
COIN 3 & 4 INPUTS
P17
COIN_3
+5V
+12V_IN
COIN_4
0.100"
GND
MTGHOLE
X5
X4
X3
X2
X1
X6
X7
MTG4
GND TAB
P18
0.250" SOLDER TAB FOR SOUND BOARD GROUND STRAP.
GND
CPU BOARD
Sheet 22 of 22
INFORMATION CONTAINED HEREIN IS CONFIDENTIAL PROPERTY AND MAY NOT BE USED OR DISCLOSED WITHOUT EXPRESS WRITTEN CONSENT FROM THE COMPANY.
PROJECT ENG. REM
FIRST PROJ. NO 40023 DATE 09DEC92
WILLIAMS ELECTRONICS AND GAMES INC.
MIDWAY MANUFACTURING COMPANY
3401 N. CALIFORNIA AVE. CHICAGO IL.
DWN. BY REM DATE
FIRST USEAGE A-14816 DATE 09DEC92
TITLE CONNECTORS
CHECKED DATE
CURRENT PROJECT 40023 DATE 09DEC92
APPROVED DATE
SHEET 22 OF 22
PART NO. 16-9423
REV. -



SOUND BOARD
Sheet 1 of 4

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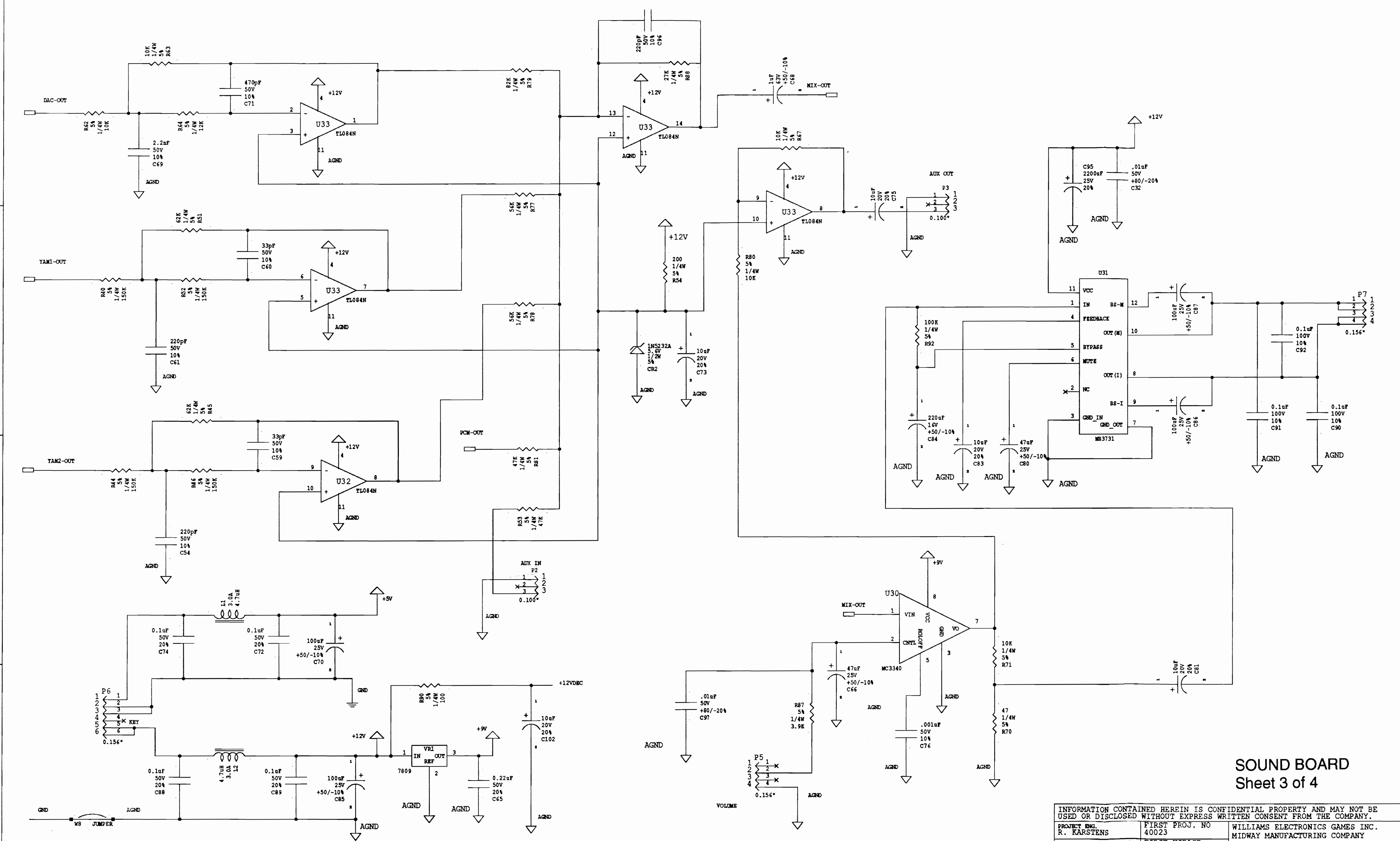
PROJECT ENG. R. KARSTENS	FIRST PROJ. NO 40023	WILLIAMS ELECTRONICS GAMES INC. MIDWAY MANUFACTURING COMPANY 3401 N. CALIFORNIA AVE. CHICAGO IL.
DWN. BY A. LASKO DATE 5/28/91	FIRST USEAGE a-14732-40023	TITLE VIDEO SOUND GENERATOR SPEECH SYSTHESIS
CHECKED R.K. DATE 5/28/91	CURRENT PROJECT 40023	
APPROVED DATE	SHEET 01 OF 04	PART NO. 16-9447 REV. –



SOUND BOARD
Sheet 2 of 4

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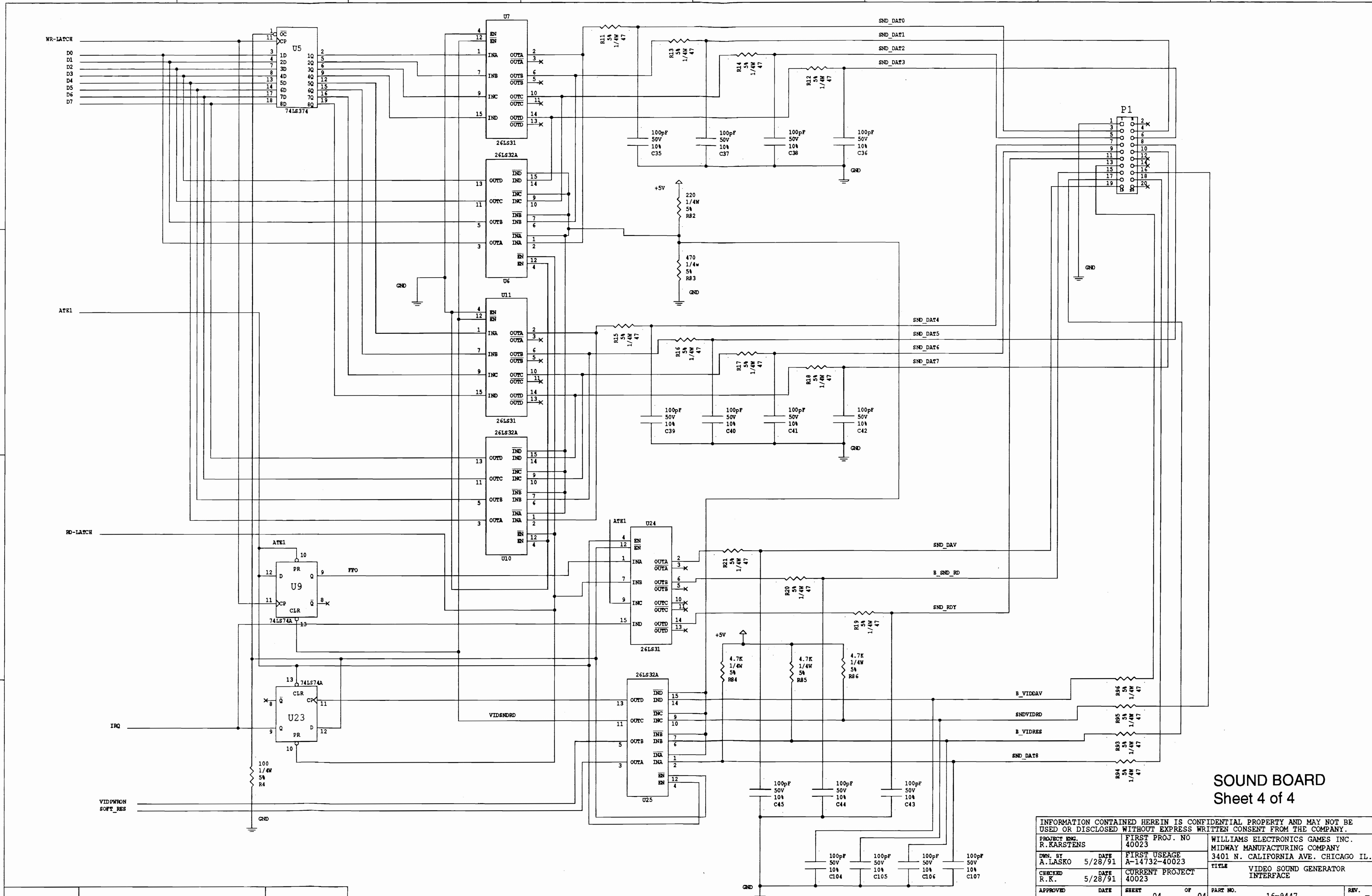
PROJECT ENG. R. KARSTENS	FIRST PROJ. NO 40009	WILLIAMS ELECTRONICS GAMES INC. MIDWAY MANUFACTURING COMPANY 3401 N. CALIFORNIA AVE. CHICAGO IL.
DWN. BY A. LASKO DATE 5/28/91	FIRST USEAGE A-14732-40009	
CHECKED R.K. DATE 5/28/91	CURRENT PROJECT 40009	TITLE VIDEO SOUND GENERATOR MUSIC SYNTHESIS
APPROVED DATE	SHEET 02 OF 04	PART NO. 16-9447 REV. -



SOUND BOARD
Sheet 3 of 4

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PROJECT ENG. R. KARSTENS	FIRST PROJ. NO 40023	WILLIAMS ELECTRONICS GAMES INC. MIDWAY MANUFACTURING COMPANY 3401 N. CALIFORNIA AVE. CHICAGO IL.
DWN. BY A.LASKO DATE 5/28/91	FIRST USEAGE A-14732-40023	
CHECKED R.K. DATE 5/28/91	CURRENT PROJECT 40023	TITLE VIDEO SOUND GENERATOR AMPLIFIER
APPROVED DATE	SHEET 03 OF 04	PART NO. 16-9447 REV. -



SOUND BOARD
Sheet 4 of 4

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PROJECT ENG. R.KARSTENS	FIRST PROJ. NO 40023	WILLIAMS ELECTRONICS GAMES INC. MIDWAY MANUFACTURING COMPANY 3401 N. CALIFORNIA AVE. CHICAGO IL.
DWN. BY A.LASKO DATE 5/28/91	FIRST USEAGE A-14732-40023	TITLE VIDEO SOUND GENERATOR INTERFACE
CHECKED R.K. DATE 5/28/91	CURRENT PROJECT 40023	
APPROVED DATE	SHEET 04 OF 04	PART NO. 16-9447 REV. -

Jumper Charts

SOUND BOARD
W2, W3, W5, W7, W8

CPU BOARD

Designator:	Value
J18, J19, J22, J24, J28 (jumper)	0 ohm
R154 (jumper)	0 ohm
J100, J101	47 ohm
R156	68 ohm
R165	39 ohm

WARNINGS & NOTICES

Warning

USE OF NON-MIDWAY PARTS OR CIRCUIT MODIFICATIONS MAY CAUSE SERIOUS INJURY OR EQUIPMENT DAMAGE! USE ONLY MIDWAY AUTHORIZED PARTS.

* For safety and reliability, substitute parts and modifications are not recommended.
* Substitute parts or modifications may void FCC type acceptance.
* This game is protected by Federal Copyright, trademark and patent laws. Unauthorized modifications may be illegal under Federal law. This also applies to MIDWAY logos, designs, publications and assemblies. Moreover, facsimiles of MIDWAY equipment (or any feature thereof) may be illegal under federal law, regardless of whether or not such facsimiles are manufactured with MIDWAY components.

Warning

This equipment generates, uses and can emit radio frequency energy and, if not installed properly and used according to the directions in this manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of part 15 of FCC rules which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference to radio communications, in which the user, at his or her own expense, will be required to take whatever measures may be needed to correct the interference.

Warning

Prevent shock hazard and assure proper game operation. Only plug this game into a properly grounded outlet. Do not use a cheater plug to defeat the power cord's grounding pin. Do not cut off the ground pin.

Notice

When MIDWAY ships a game, it is in compliance with FCC regulations. Your sticker is proof. If the sticker is missing or damaged, legal repercussions to the owner or distributor of the game may result. If your game does not contain an FCC sticker, call MIDWAY immediately.

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For Service: Call your Authorized MIDWAY Distributor.

"NA NA HEY HEY KISS HIM GOODBYE"
(Arthur Dale Frashuer, Paul Roger Leka, Gary De Carlo)
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